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A BIBLIOGRAPHY OF THE SARDINES

By
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INTRODUCTION

"Packed like sardines in a can" is a familiar enough expression to few persons is it known that the sardine packing business in nwall, England, and Brittany, France, is the life blood of com- ce and the very sustenance of the fisherfolk. Nor is it much more ely known that the California sardine furnishes by far the largest put of any single fish (494,000,000 pounds for 1930) in the huge ing industry of this State. Some seasons in Europe the sardine es in enormous schools and then at other times fails to put in an earance. A French expression "la crise sardinière" (the sardine is) conveys the idea that a failure takes on the proportions of a ster, and such it is to the people who depend upon it almost solely food and employment. As would be expected much has been written account for the erratic habits of this fish, which is so vital to the mercial life of our State as well as certain parts of Europe. So in hope that a collection of all the theories and the facts, both scientific commercial, might prove of assistance to those interested, this liography has been compiled.

The work of compiling was started by Mrs. Ruth Miller Thompson completed by the writer after almost two years of research in ven libraries on both the east and west coasts of the United States. pers dealing with life history, classification, anatomy and commercial ormation about the sardines of the world are included. The list is complete as possible but some papers were omitted for lack of suf- ent information and doubtless others have been overlooked. The cies included are *Sardina pilchardus* (Europe), *Sardina melanosticta* pan), *Sardina ocellata* (South Africa), *Sardina sajax* (west coast South America), and *Sardina caerulea* (west coast of North Amer-). Other names than these have crept in through synonomy and ause it seemed wise to include fossil forms. It must be confessed t even the herring worked itself in, but this fish, once inside a tin, en masquerades as a sardine, and to the person interested in fish ning and disposal of fish waste, a sardine is a sardine no matter if s a masquerading herring.

A question often asked is, "How do you start making a bibliog- hy?" The writer's way was to go through all the literature in the rary of the California State Fisheries Laboratory, to find everything sardines, keeping a sharp lookout all the while for allusions to other icles. When an article was found, its contents were summarized, later a search was made for the references contained within it. s last process necessitated translation from the French, German, lian, Spanish, Norwegian, Danish, Slavonian, and Latin. The neces- for consultation and summarizing of papers occasioned trips to the owing libraries: University of California, Stanford University, Cali- nia Academy of Sciences, Harvard Museum of Comparative Zoology, erican Museum of Natural History, Surgeon General's Library, ited States Bureau of Fisheries, Library of Congress, Smithsonian titution, and United States National Museum. It might seem need- to go to all the labor of consulting every paper, but it has been painful experience of the writer that everyone makes errors in

copying citations, and only with the utmost care in verification a rechecking can reasonable accuracy be attained. Even a collection accurate titles, with no guide to their contents, is of small value to t researcher compared to an annotated list. A few words to explain t contents may save him much time, both in eliminating the useless a in finding the valuable papers. These summaries, given again in t form of an index, are offered as further assistance to the investigat

Consistency in such detailed work is almost the despair of t compiler, for with the utmost care inconsistencies appear as by e magic. Accuracy, however, is the most valued attribute but at tin it has a most annoying propensity for clashing with consistency. Tit of periodicals have an exasperating way of changing, spellings a names of species and genera vary, so at times the confusion seems ho less. However, the plan followed was to smooth out the inconsistenc of names and spelling in the subject index according to the best ju ment possible but in the résumé appended to each title, to have t name and spelling just as the author wrote it. In all but a few tit the date of printing has been determined, but in a few cases it co not be ascertained. In some instances the date in the margin is not date quoted in the title, for instance:

Radcliffe, *Lewis.*

1923. Fisheries industries of the United States. U. S. Comm. Fi Rept. [for 1922].

The marginal date is always the date of printing and for the sake completeness the other date is included to indicate the period cove by the contents. The brackets are for clarity.

Since the importance of a paper or article lies principally in opinion of the individual reader, it was thought best not to indic this point but rather to allow the searcher to form his own idea fr the number of pages of the article, the résumé, or the author's stand in the subject treated. The system of listing the authors alphabetica and the papers of each author chronologically is the same as follo in "A Bibliography of the Tunas."[1] Likewise, a list is included of periodicals cited with the abbreviations used, this being done in hope of saving the time and temper of the investigator, who too of is delayed by exasperating search occasioned by incomplete or n leading citations.

It is the pleasure of the writer to acknowledge the friendly coop tion of all the librarians to whom appeal was made, and especia to the following: Miss Eleanor K. Sweet, Museum of Compara Zoology, Harvard College; Miss Louise Beitzell, United States Bur of Fisheries; Mr. J. V. Butt, Smithsonian Division of the Library Congress; Miss Margaret Titcomb, American Museum of National H tory; and Dr. E. W. Gudger, who as Bibliographer at the Ameri Museum of Natural History, offered not only encouragement but uable suggestions. Grateful thanks are due members of the staf the California State Fisheries Laboratory, especially Miss Kathe Karmelich who typed the manuscript and rendered valuable assista in preparing the bulletin for printing.

May, 1931.

[1] Corwin, Genevieve. 1930. A bibliography of the tunas. Calif. Div. Game, Fish Bull., no. 22, 103 pp.

AUTHORS' LIST OF TITLES

NOTE.—The date directly beneath the author's name is the date of printing. es inserted elsewhere and inclosed in brackets indicate the period for which the me was issued. The pages given are for sardine information only (not the entire ents of the article or book). A dagger (†) indicates papers not seen by the com- but thought important enough to include. Titles of serials are given exactly as the year quoted regardless of subsequent changes. The résumés contain exact es and spelling used by the author quoted and therefore exhibit many inconsis- ies. Numbers in bold-face type (such as **10**) indicate volume number.

A

ott, *James Francis.*

900. The marine fishes of Peru. Acad. Nat. Sci. Philadelphia, Proc. [for 1899] p. 334.

Clupanodon sajax: synonomy.

oque, *A.*

900. Faune de France contenant la description des espèces indigenes disposées en tableaux analytiques . . . Paris, p. 460.

Alosa sardina: described; figured.

linsell, *A. W.*

884. On a case of poisoning by sardines. Lancet, London, **2**, p. 540.

lo, *Frederick George.*

901. The herring and its kindred. *In* Cornish, C. J., The living animals of the world. London, 1901–1902, 2 vols., p. 659, 661, 1 fig.

Pilchard described; figure of Australian pilchard; range on British coast.

904.1. The sea-fishing industry of England and Wales. A popular account of the sea fisheries and fishing ports of those countries. London, p. 9, 10, 17–18, 66–68, 86, 289, 334–335.

Pilchard: fluctuations in abundance on French and English coasts; fishing methods and gear; exports and imports; alternation of abundance of herring and pilchards; methods of preservation; old fishing regulations (time of Queen Elizabeth); statistics of Cornwall fishery.

904.2. British salt-water fishes with a chapter on the artificial culture of sea fishes by R. B. Marston. London, p. 54, 201, 205–206.

Clupea pilchardus: habits; fishing methods and gear; spawning; description of egg.

ejos Sanz, *Luis.*

923. Provincia de Santander. *In* La pesca marítima en España en 1920. Madrid, **2**, p. 166–168, 186. *Also in* Bol. Pescas, 1922, **7**, no. 65–67, p. 42–44, 62.

Clupea pilchardus: fishery; statistics.

ert I, *Honoré Charles (Prince de Monaco)*

887. Le pêche de la sardine sur les côtes d'Espagne. Revue Sci., 3. sér., **13**, p. 513–519. *Also separate*, L'industrie de la sardine sur les côtes de la Galice. Paris, 1887.

Migrations; food; methods of fishing and gear; salting and canning methods; laws regulating fishery.

rovandi, *Ulyssis.*

638. De piscibus libri V. Bononiae, p. 219–220.

Sardina: description.

ıry, *J.*

913. Les bateaux de pêche à moteur à Arcachon. Le Yacht, no. 1765, Jan. 6. *Extract in* Bull. Trim. Pêch. Marit., **18**, no. 2, p. 244–251, 6 figs.

Construction of motor boats used in French sardine fishery.

en, *E. J.*

920. Report on investigations at the western end of the English Channel. Cons. Explor. Mer, Publ. Circ., no. 72, p. 8–9.

Bibliography of recent work on European sardine.

Allen, *E. J.*—Continued.

1922. Programme of work on mackerel and pilchard submitted to the fish sectio of the International Council for the Study of the Sea. Cons. Explo Mer, P. V., **28**, p. 36–38. [Text in English and French.]

Scientific investigations.

Allen, *Winfred Emory.*

1920. Behavior of loon and sardines. Ecology, **1**, p. 309–310.

Sardinella caeruleus: behavior.

1930. Elusive sardines. Catalina Islander, **17**, no. 4, Jan. 29, p. 10.

Behavior of school of sardines when pursued by loon.

American Fish Culturist.

1904. Sardines. American Fish Culturist, **1**, no. 3, p. 15.

Short article on European methods of canning.

Amieux, *Louis.*

1909. L'industrie sardinière et ses nécessités. Cong. Pêch. Marit., Sable d'Olonne, C. R., **2**, p. 28–33. *Also in* Documents concernant la crise sa dinière. 1903 à 1912. Réunis par Louis Amieux. Nantes, 1912, fasc., p. 82–86.

Suggestions for improving French sardine industry.

1912. Documents concernant la crise sardinière. 1903 à 1912. Réunis par L Louis Amieux. Nantes, 1. fasc., 185 pp.

Collected documents relating to the sardine failure in 1912; "filets tou nants," a kind of net, described; reports and information concerning t sardine question.

1929. Les tendances actuelles de l'industrie des conserves de poissons sur les côt de Bretagne et de Vendée. Pêch. Marit., **12**, extra number for Sept. p. 79–81.

Present day tendencies in the French sardine canning industry.

Andrews, *Carroll B.*

1928. Seasonal average length trends at Monterey of the California sardine (*Sa dina caerulea*). Calif. Div. Fish Game, Fish Bull., no. 13, 13 p *Reviewed in* Cons. Explor. Mer, Journ., 1929, **4**, no. 1, p. 118–119; no. p. 226–229.

Description of statistical methods; tables; graphs.

Anthony, *R.*

1909. La croisière du "René" entreprise pour contribuer à l'étude biologique de sardine. Cong. Pêch. Marit., Sables-d'Olonne, C. R., **2**, p. 43–49.

Outline of plan for investigation of causes of sardine migrations.

Antipa, *Gregor.*

1904. Die Clupeinen des westlichen Teiles des Schwarzen Meeres und der Dona mündungen. Akad. Wiss. Wien, Anz., **41**, p. 302.

Sardina dobrogica from Black Sea described.

1906. Die Clupeinen des westlichen Teiles des Schwarzen Meeres und der Dona mündungen. Akad. Wiss. Wien, Denkschr. [for 1905] **78**, p. 39–44, 7 fi

Clupea dobrogica (Black Sea sardine): description; figured; comparis with *Sardina pilchardus* in form and measurements; methods of fishing Black Sea.

Apicius, *Coelius.*

1705. Apicii Coelii de opsoniis et condimentis, sive arte coquinaria, libri X. L dini, lib. 9, ch. 10, p. 213.

Recipe for preparing sardines as food.

Apostolidès, *Nicholas Chr.*

1883. La pêche en Grèce. Athène, p. **31**, **36**, **45**.

Meletta phalerica: fishing seasons; fishing methods and gear.

rgentier, ------.

1919. Étude d'ensemble sur les pêches de la sardine, du thon et des crustacés en Méditerranée. 6. Cong. Nat. Pêch. Marit., Tunis, 2, p. 72–104.

A summary of questionnaires sent to Corsica, Algeria and five maritime districts of France to find out fishing methods and gear, size and location of factories, fluctuations of fishery, value and disposal of product, methods of preservation.

rné, *Paul.*

1927. Rapport sur les sardines de la région de Saint-Jean-de-Luz. France Off. Sci. Pêch. Marit., Notes, no. 52, p. 58–75. *Reviewed in* Pêch. Marit., 1927, 10, no. 492, p. 692.

Statistics of French fishery; temperature; density; spawning season; sexual maturity; eggs and larvae; size at different ages (age determined by scale readings).

1928.1. Note sur les sardines de la région de Saint-Jean-de-Luz. Soc. Océanogr. France, Bull., 8, no. 42, p. 794–798.

Age and size; scale structure; two figures of scales showing growth rings; spawning.

1928.2. La pêche de la sardine dans la région de Saint-Jean-de-Luz en 1927. France Off. Sci. Pêch. Marit., Revue Trav., 1, fasc. 1, p. 54–73.

Conditions of fishery; temperature and density of water; state of sexual maturity at different times of year; size and age; growth as recorded on scales; figures of six scales.

1929. La pêche de la sardine dans la région de Saint-Jean-de-Luz en 1928. France Off. Sci. Pêch. Marit., Revue Trav., 2, no. 2, p. 137–151. *Reviewed in* Pêch. Marit., 1929, 12, no. 595, p. 659.

Statistics of the fishery for 1927 and 1928; races; spawning period; growth; morphological characters (number of vertebrae, length, position of dorsal fin).

rtedi, *Peter.*

1788. Bibliotheca ichthyologia . . . emendata et aucta a Iohanne Iulio Walbaum. Grypeswaldiae, 1788–1792.

See Walbaum, J. J., editor.

rthur, *W.*

1883. Notes on the picton herring, *Clupea pilchardus* (*C. sajax*, New Zealand form). New Zealand Inst., Trans., 15, p. 208–213, 1 pl.

Description of four specimens of *Clupea sajax*, including stomach contents; spawning season; distribution.

thanassopoulos, *G.*

1925. Notes sur la pêche en Grèce. Inst. Océanogr. Monaco, Bull., no. 454, p. 6–7.

Use of "terre rouge" in salting sardines; chemical composition of substance.

tco Fisheries News.

1925. Pilchard oil industry. Atco Fish. News, Oct., p. 6.

Oil industry on Vancouver Island.

uché, *A.*

1894. Sur le cocco-bacille rouge de la sardine. Soc. Biol. Paris, C. R., 10. sér., 1, p. 18–21.

Bacteriology of canned sardines.

uffret, ------.

1930. Résultats de la pêche en Algérie pendant le 2e semestre de l'année 1929. Sta. Aqui. Pêch. Castiglione, Bull. [for 1929] p. 202.

Sardine statistics.

utran, *H.*

1912. Rapport . . . à M. le directeur de l'office national du commerce extérieur, Paris. Objet: Conserves de sardines à l'huile françaises. Concurrence norvégienne. *In* Documents concernant la crise sardinière. 1903 à 1912. Réunis par Louis Amieux. Nantes, 1. fasc., p. 10–12.

Autran, *H.*—Continued.

Canning of sardine; controversy with Norway over labeling other kinds of fish as sardines.

Avard, *C. C.*

1918. The canning of sardines at Black's Harbor. Canadian Fish., 5, p. 1002–1014.

Methods of fishing and canning (small herring), east coast of Canada.

Ayson, *L. F.*

1924. New Zealand fish and fisheries. Wellington, p. 7.

Sardinia neopilchardus listed among the most important market fish.

B

Barclay, *M.*

1910. Paa Sardinfiske fra Concarneau, forsog med Kveiterogn som Sardinagn. Norsk. FiskTid., 29, heft 6, p. 203–215, 12 figs.

Methods of sardine fishing at Concarneau; methods of preservation.

Barnard, *K. H.*

1925. A monograph of the marine fishes of South Africa. S. African Mus., Ann., 21, pt. 1, p. 112.

Sardina sajax: description; distribution; eggs and larvae described.

Barron, *Jonathan.*

1897+. Cornwall sea fisheries district local fisheries committee. Report of fishery officer. Mevagissy. Quarterly report (current).

Condition of sardine fishery.

Bateson, *William.*

1890. Pilchards (*Clupea pilchardus*) with the number of scales abnormally increased. Zool. Soc. London, Proc., p. 586–588.

Description and discussion of specimens showing abnormal number of scales.

1894. [On specimens of the common pilchard, *Clupea pilchardus*, showing variation in the number and size of the scales.] Zool. Soc. London, Proc., p. 164.

Discussion of size and number of scales of six specimens of pilchard taken in Cornwall.

Baudouin, *Marcel.*

1888. L'industrie de la sardine en Vendée. Revue Sci., 41, 3. sér., 15, p. 651–660, 689–692. *Also separate*, 1894.

Sardine fishing methods and gear in Vendée, France; methods of preservation including canning; discussion of causes of failure of fishery.

1893.1. La pêche de la sardine en Vendée. La pêche sablaise au commencement du siècle. Revue Sci. Nat. Ouest, 3, p. 278–281.

History of sardine fishery of Vendée at beginning of 19th century.

1893.2. L'industrie de la sardine en Vendée. Revue Sci. Nat. Ouest, 3, p. 289–336. (This paper, an elaboration of Baudouin, 1888, much enlarged; illustrated.)

Fishing areas; habitat; migrations; influence of winds on presence of sardines; history of fishery on coast of Vendée; description of methods and gear; history of canning factories; methods used in canning; statistics of fishery; causes of decline in fishery for ten preceding years.

1904. Le *Lernæenicus sprattae* parasite de la sardine en Vendée. Acad. Sci. Paris, C. R., 139, p. 998–1000. *Also separate*, Paris, 1904, 4 pp., 1 fig.

Copepod parasite of sardine.

1905.1. Nouvelles observations sur le *Lernæenicus*, copépode parasite de la sardine. Mus. Hist. Nat. Paris, Bull., 10, p. 299–300.

Copepod parasite.

audouin, *Marcel*—Continued.

1905.2. Mode de fixation dorsale du *Lernæenicus sardinae* sur son hôte. Acad. Sci. Paris, C. R., **140**, no. 5, p. 326–327.

Copepod parasite.

1905.3. Les parasites de la sardine. Revue Sci., **3**, p. 715–722, 6 figs.

Discussion of all the known parasites of sardines: isopods, copepods, coccidia, trematodes, nematodes; special study of *Lernæenicus sardinae*, with description and six figures.

1907. Du mode d'attaque de la sardine (*Clupea pilchardus* W.) par un copépode parasite (*Lernæenicus sardinae* M. B.) in Vendée. Soc. Sci. Nat. Ouest France, Bull., **7**, 2. sem., fasc. 3–4, p. 97–114, 6 figs. *Also separate*, Nantes, 1908, 20 pp., 6 figs.

Anatomy and mode of attachment of this copepod parasite.

1908. Mode d'attaque du spratt (*Clupea spratta*) par le *Lernæenicus sprattae*, copépode parasite de l'oeil du poisson. Assoc. Franç. Avanc. Sci., C. R. [for 1907] 36. sess., pt. 1, p. 259; pt. 2, p. 727–741.

Copepod parasite of sardine eye.

1909. Nouvelles observations statistiques sur le parasite principal *Lernæenicus sardinae* (M. Baudouin). Cong. Pêch. Marit., Sables-d'Olonne, C. R., **1**, p. 120–138.

Copepod parasite of sardine.

1910. Mode de fixation du *Lernæenicus sardinae* M. B. sur l'oeil de la sardine (*Clupea pilchardus* Wal.). Assoc. Franç. Avanc. Sci., C. R. [for 1909] **38**, p. 658–662.

Copepod parasite of sardine; morphology; mode of fixation.

1911.1. Un cas de parasitisme exceptionel chez la sardine (*Lernæenicus sprattae*). Soc. Sci. Nat. Ouest France, Bull., 3. sér., **1**, p. iii–iv.

Copepod parasite on eye of sardine.

1911.2. Découverte d'un type de transition entre *Lernæenicus sardinae* M. Baudouin et *L. sprattae* Sowerby, sur la même sardine (*Clupea pilchardus* Wal.); *L. sardinae*, variété *moniliformis*. Assoc. Franç. Avanc. Sci., C. R. [for 1910] **39**, p. 163–167.

Description of two species of copepod parasites on the same sardine.

1914. Deux examples d'atavisme chez le copépode parasite du spratt et de la sardine (*Lernæenicus sprattae* Sow.). Assoc. Franç. Avanc. Sci., C. R. [for 1913] **42**, p. 369–370. *Also separate*, Paris, 1914.

Copepod parasite.

1918. Découverte d'une variété de *Lernæenicus sardinae* M. B. entre le type et la variété *moniliformis*. Mus. Hist. Nat. Paris, Bull., no. 6, p. 394–396.

A new variety of copepod, parasitic on the eye of sardine.

Bauer, *V.*

1921. La pesca marittima in Turchia. Italy Com. Talasso., Boll. Bimes., no. 66–68, (**9**, fasc. 4–6), p. 112, 115.

Clupea pilchardus listed with Turkish common names; statistics.

Bean, *Tarleton Hoffman.*

1880. A list of European fishes in the collection of the United States National Museum. U. S. Nat. Mus., Proc. [for 1879] **2**, p. 37.

Clupea sardina listed.

1903. Catalogue of the fishes of New York. New York State Mus., Bull., no. 60, zool. **9**, p. 209.

Sardinella sp., one specimen of nine inches recorded from Gravesend Bay in 1895.

Bean, *Tarleton Hoffman*, and Dresel, *H. G.*

1885. A catalogue of fishes received from the public museum of the Institute of Jamaica, with descriptions of . . . two new species. U. S. Nat. Mus., Proc. [for 1884] **7**, p. 169.

Clupea pseudohispanica recorded from Jamaica.

Beard, *Harry Randall.*

1921. California sardine food products and their preparation. Calif. Fish Game, 7, no. 4, p. 238–247. *Also in* U. S. B. F., Mem. Ser., no. 274, 6 pp.

Methods of canning in California; food value equal to all other meats.

1922. Changes in oil used for frying sardines. Calif. Fish Game Comm., Circ., no. 1, 8 pp. *Also in* Fish Gaz., 1922, 39, no. 11, p. 32–34, 63; *and* U. S. B. F., Mem. Ser., 1923, no. 243, 3 pp.

Experiments in canning California sardines.

1923. Some considerations concerning the canning of sardines. American Fish. Soc., Trans., 53, p. 122–130.

Canning.

1924. Drying of fish for canning as sardines. Pacific Fish., 22, no. 10, p. 9–10.

Canning processes.

1925. New method of preparing sardines. Pacific Fish., 23, no. 3, p. 12–14.

Canning methods—clear, detailed discussion with diagram of apparatus.

1928. Preparation of fish for canning as sardines. U. S. B. F., Rept. [for 1927] (Doc. 1020); Technological Contribution no. 34.

Detailed description of different methods and apparatus for canning sardines employed throughout the world.

Bellet, *Daniel.*

1913. Les sardiniers et les lois économiques. Journ. Écon., 72, Feb., p. 241–247.

Discussion of sardine failure from economic point of view.

Belloc, *Georges.*

1927. Rapport sur les croisières aeriennes. France Off. Sci. Pêch. Marit., Notes, no. 52, p. 52–55.

Description and map of trips made by dirigible to find sardine schools off the southwest coast of France.

1930. La question de la sardine dite "sauvage." France Off. Sci. Pêch. Marit., Revue Trav., 3, fasc. 1, p. 47–62.

New out-of-season fishery discovered in 1925 off Sables-d'Olonne of inferior quality fish; investigation on size; proportion of sexes; body proportions; number of vertebrae; growth; females larger at same age; sexual maturity; intestinal fat; temperature of water; salinity; food; summary of characters distinguishing this group of sardines; differences shown after cooking for canning; four figures showing adult fish.

Belloc, *Georges,* and **Desbrosses,** *P.*

1930. Remarques sur la sexualité de la sardine *Clupea pilchardus* Walb. France Off. Sci. Pêch. Marit., Revue Trav., 3, fasc. 1, p. 63–77.

Description and diagrams of mature gonads; varying results in investigations on relation between size and sex; proportion of males and females; growth; sexual maturity; morphological characters (measurements of different parts of body showing sexual dimorphism).

Belon, *Picrre.*

1553. De aquatilibus, libri duo. Cum eiconibus ad vivam ipsorum effigiem, quoad eius fieri potuit, expressis. Parisiis, p. 170–172.

Description of sardine.

Bénard, *Charles.*

1903. La question sardinière. Bordeaux, p. 3–16.

Life history of European sardine as far as known; migrations; food; suggestions for scientific study of sardine question; criticism of nets and bait; comparison with Spanish and Portuguese methods and gear; recommendations to help situation.

Bénard, *Charles,* and **Künstler,** *J.*

1903. Rapport . . . à M. le président de la chambre de commerce de Bordeaux. Bordeaux, p. 3–27.

Recommendations for improvements in methods and gear used in French sardine fishery.

Bennett, *Eugene D.*

1928. Report of executive officer. Calif. Fish Game Comm., 30. Bienn. Rept. [for 1926–1928] p. 23–24.

Reduction *vs.* canning; litigation concerning same.

Benoit, *A.*

1912. Une délégation des fabricants appuie près de M. Delcassé le voeu de leur congrès, et lui laisse 2 notes précisant leurs desiderata. *In* Documents concernant la crise sardinière. 1903 à 1912. Réunis par Louis Amieux. Nantes, 1. fasc., p. 95–98.

Plea for improvement of methods of fishing and canning sardines in France.

Berg, *L. S.*

1913. XV. A review of the clupeoid fishes of the Caspian Sea with remarks on the herring-like fishes of the Russian empire. Ann. Mag. Nat. Hist., **11**, ser. 8, p. 472–481.

Sardinella for *sardina:* description; distribution.

Berthoule, *Amédée.*

1887.1. Les migrations sous-marines (sardines). Soc. Acclim. France, Bull., **4**, p. 97–110.

Clupea pilchardus: migrations.

1887.2. Statistique de l'industrie sardinière. Preparation des conserves. Commerce des produits. Journ. Off., **19**, no. 291, Oct. 25, p. 4723–4725; no. 292, Oct. 26, p. 4739–4742; no. 293, Oct. 27, p. 4758–4760; no. 295, Oct. 29, p. 4789–4792; no. 296, Oct. 30, p. 4803–4805. *Also in* Revue Marit. Colon., 1888, **98**, p. 33–74.

Statistics; economic conditions of fishermen; tariff.

Bertin, *Léon.*

1925. Recherches bionomiques, biométriques et systématiques sur les Épinoches (Gastérostéidés). Inst. Océanogr. Monaco, Ann., **2**, no. 1, p. 129.

European races of sardine based on number of vertebrae.

Bertram, *James G.*

1869. The harvest of the sea. A contribution to the natural and economic history of the British food fishes. London, p. 251–254.

Sardine fishing methods and gear in England; food; salting in Cornwall and canning methods (sprat as sardines in Brittany).

1883. The unappreciated fisher folk. Their round of life and labour. Intern. Fish. Exhib., Lit., **2**, p. 32–38, 57.

Pilchard fishing methods and gear; curing methods; conditions of fishermen in Cornwall.

Biden, *C. Leo.*

1930. Sea-angling fishes of the cape. (South Africa.) London, p. 57, 101, 134.

Clupea sajax: season of appearance; enormous quantities found dead on beach; probable intermediate host of worm parasite.

Biétrix, *E.*

1890. L'oeuf de la sardine. Journ. Anat. Physiol. Paris, **26**, p. 630–636.

Description of sardine egg (Concarneau); no illustrations.

Blanchère, *Henri de la.*

1868. La pêche et les poissons. Nouveau dictionnaire générale des pêches. Paris, p. 695–698.

Clupea sardinia: description; common names in Europe; fishing methods and gear of France.

Blavier, *A.*

1882. Théorie explicative du régime climatologique observé en France sur le littoral océanien, depuis 1880, et de la disparition de la sardine sur ce littoral depuis le même époque. Acad. Sci. Paris, C. R., **94**, p. 769–772.

Theory that currents and temperature explain disappearance of sardine.

Bleeker, *Pieter.*

1853. Nalezingen op de ichthyologie van Japan. Batav. Genoot. Kunst. Wetens., Verh., **25**, p. 49–50.

Harengula punctata (= *Clupea sajax* according to Günther, 1859): description.

1860. Over eenige vischsoorten van de Kaap de Goede Hoop. Nat. Tijdschr. Nederlandsch-Indië, **21**, p. 56.

Clupea ocellata recorded from Cape of Good Hope.

Blin, _____.

1923. Note sur l'alimentation de la sardine: *Euterpes* et sardines. Soc. Zool. France, Bull., **48**, no. 2–3, p. 99–105, 4 figs.

Food of sardine; presence of copepod *Euterpes*, correlated with presence of sardine.

Bloch, *Marc Éliéser.*

1797. Ichtyologie, ou histoire naturelle, générale et particulière, des poissons. Berlin, **6**, 12. pt., p. 32–35.

Sardine: synonomy; description; amounts caught in Cornwall; methods of preservation in Cornwall.

Bloch, *Marc Éliéser*, and Schneider, *Johann Gottlob.*

1801. Systema ichthyologiae iconibus cx illustratum. Berolini, p. 425.

Clupea pilchardus: short description.

Boletín de Pescas. *See* Spain. Instituto Español de Oceanografía.

Bolin y de la Cámara, *Alfonso.*

1922. La pesca marítima en España en 1920. Asturias. Bol. Pescas, **7**, no. 68–72, p. 119, 124, 163.

Statistics of sardine fishery.

Bonde, *Cecil von.*

1929. List of the commoner edible fishes of South Africa. Union S. Africa Fish. Mar. Biol. Surv., Rept., no. **7**, p. 60.

Clupea sajax listed.

Bonnard, *A.*

1902. La pêche côtière et la colonisation maritime en Algérie. Paris, p. 153–156.

Sardine fishery of Algeria.

Bonnassieux, *Pierre.*

1900. Conseil de commerce et bureau du commerce 1700–1791. Inventaire analytique des procès-verbaux. France Min. Instruct. Publ., Arch. Nat., p. 59, 66, 105, 138, 296, 312, 314, 316, 327, 333, 338, 357, 358, 363, 364.

History of commerce in sardines; fishery in France.

Bonnaterre, (*L'Abbé*) *Joseph P.*

1788. Tableau encyclopédique et méthodique des trois règnes de la nature . . . Ichthyologie. Paris, p. 185, pl. 75, fig. 311.

Sardine described and figured.

Bonneff, *Léon* and *Maurice.*

1911. La classe ouvrière. Paris, p. 205–211.

Methods of sardine fishing and gear in Brittany.

Bonnot, *Paul.*

1930. Report on the relative merits and demerits of purse seine vs. lampara nets in the taking of sardines. Calif. Fish Game, **16**, no. 2, p. 125–130.

California methods of fishing and gear; purse seine thought not to be destructive of fish and of equal merit with lampara.

Booth, *F. E.*

1915. California anchovies can not be called sardines. Pacific Fish., **13**, no. 7 p. 36.

Letter concerning misinterpretation of labeling regulations.

Borja y Goyeneche, *Joaquín de.*

1920. Contribución al estudio de la fauna ictiológia de España. R. Acad. Cienc. Barcelona, Mem., tercera época, **16**, no. 3, p. 23.

Clupea pilchardus: location and number of captures.

Borlase, *William.*

1758. The natural history of Cornwall. The air, climate, waters, rivers, lakes, sea . . . rare birds, fishes, shells, reptiles, and quadrupeds . . . Oxford, p. 272–273.

Pilchard industry information and statistics.

Bott, *Antoine.*

1912. Opinion . . . *In* Documents concernant la crise sardinière. 1903 à 1912. Réunis par Louis Amieux. Nantes, 1. fasc., p. 183–185.

Discussion of relative value of the seine and the "filet tournant" used in capture of sardines.

Bouchon-Brandeley, *G.*

1887. Rapport adressé au ministre de la marine et des colonies . . . sur la question de la pêche de la sardine. Journ. Off., **19**, no. 158, p. 2636–2638; no. 159, p. 2650–2653.

Condition of sardine fishery at different French ports.

Bounhiol, *Jean Paul.*

1912.1. Sur la détermination de l'âge de la sardine algérienne. Acad. Sci. Paris, C. R., **154**, p. 1721–1723.

Scales do not show "winter rings" on account of mild Algerian winters; body measurements (tip of mandible to center of eye) used to determine age.

1912.2. Un chronomètre de la sardine algérienne. Assoc. Franç. Avanc. Sci., C. R. [for 1912] conférences faites à Paris, p. 148–149.

Age determination can not be by scale readings because water temperature is practically the same all year; determination by measurements necessary.

1913.1. Sur la reproduction de la sardine algérienne. Acad. Sci. Paris, C. R., **156**, p. 1565–1567.

Spawning period of species; duration of spawning period for individual.

1913.2. Nouvelles observations sur la reproduction de la sardine algérienne. Acad. Sci. Paris, C. R., **156**, p. 2008–2010.

Age at first spawning, thirteen months; fecundity (45,000 eggs).

1916. Sur l'interprétation des sillons d'accroissement inscrits sur les écailles des poissons périodiques. Soc. Biol. Paris, C. R., **79**, no. 18, p. 1005–1008.

Interpretation of growth rings of sardine scales with reference to growth and age.

1917.1. Le dimorphisme sexuel chez la sardine (*Alosa sardina* L.) des côtes d'Algérie. Soc. Biol. Paris, C. R., **80**, no. 2, p. 77–80.

Males do not grow as fast as females.

1917.2. Sur la distribution verticale des bancs de sardines dans les eaux littorales de l'Algérie. Soc. Biol. Paris, C. R., **80**, no. 10, p. 476–479.

Correlation between storms and large catch.

1919.1. De l'influence de quelques facteurs physiques (température, tension électrique) sur les déplacements verticaux de la sardine algérienne. 6. Cong. Nat. Pêch. Marit., Tunis, **1**, p. 67–75.

Physical factors affecting vertical distribution.

1919.2. Notes biologiques sur la sardine algérienne. 6. Cong. Nat. Pêch. Marit., Tunis, **1**, p. 75–84.

Age; growth; age of first spawning.

1923.1. Les pêches maritimes en Algérie. La sardine. Pêch. Marit., **6**, no. 256, p. 254.

Alosa sardina: migrations; spawning season.

Bounhiol, *Jean Paul*—Continued.

1923.2. La pêche de la sardine et l'utilisation du poisson devraient être modernisées. Pêch. Marit., **6**, no. 259, p. 301–302.

Algerian fishing methods and gear.

1924. De l'influence des temps orageux sur la présence de la sardine dans les eaux superficielles. Bull. Trim. Pêch. Marit., **29**, no. 4, p. 20–22.

Influence of stormy weather on drawing of sardines to surface (0–4[illegible] meters).

Bourge, _____.

1919. Les pêches maritimes de la Tunisie. 6. Cong. Nat. Pêch. Marit., Tunis, 2[illegible] p. 13, 35.

Sardine: statistics; season.

Bouvier-Lapierre, *Émile.*

1887. Observations sur la sardine. Soc. Biol. Paris, C. R., 8. sér., **4**, p. 795–79[illegible]

Length fluctuations; seasons; generalizations drawn from the daily commercial records of France taken from 1865 to 1887; no statistical tables.

Boyer, *Antide.*

1912. Proposition de loi déposée en 1907 par M. Antide Boyer, député. *In* Documents concernant la crise sardinière. 1903 à 1912. Réunis par Louis Amieux. Nantes, 1. fasc., p. 81.

Suggestions for improving French sardine fishery.

Boyer, *Jacques.*

1913. The French sardine industry. Sci. American, **108**, no. 18, May 3, p. 394. *Reviewed in* Pacific Fish., 1913, **11**, no. 6, p. 15.

Fishing methods and gear; canning methods.

Brandes, *Rudolph.*

1838. Ueber das Pilchardöl. Arch. Pharm., **66**, p. 85–87.

Pilchard oil.

Breder, *Charles Marcus.*

1928. Nematognathi, Apodes, Isospondyli, Synentognathi, and Thoracostraci from Panama to Lower California with a generic analysis of the Exocoetidae. Bingham Oceanogr. Coll., Bull., **2**, art. 2.

Clupanodon caerulus: young found in Gulf of California.

1929. Field book of marine fishes of the Atlantic coast from Labrador to Texas. New York, p. 67–68.

Sardinella sardina, S. macrophthalmus: description; distribution; key; figured.

British Columbia. Commissioner of Fisheries.

1919. Pilchards. Report [for 1918] p. x 15.

Good season; some packed by salmon canners.

1930. Pilchard and herring investigation. Report [for 1929] p. j 15.

Report of progress of work and of expansion of reduction industry.

1931. Report [for 1930] p. I 10–11.

Outline of investigation on pilchard; length studies; determination of age by otoliths; food.

Brocklesby, *H. N.*, and Denstedt, *O. F.*

1930. The nutritive value of marine products. III. Vitamin D content of commercial pilchard oil. Canadian Chem. Met., **14**, p. 13.

Experiments showing vitamin D potency.

Bronkhorst, *L.*

1923. Essais de pêche à la sardine sur les côtes du Maroc par les dundées "Montcalm" et "Emma Paule," du quartier de Douarnenez. Bull. Trim. Pêch. Marit., **28**, no. 2, 5. sec., p. 1–7.

Experiments on fishing methods on Moroccan coast.

ook, *George.*

1885. The spawning period of the British food-fishes. Scotland Fish. Bd., 4. Ann. Rept. [for 1885] p. 253.

Clupea pilchardus: spawning period.

own, *C. Inness.*

1918. Sardine industry at Vigo, Spain. Pacific Fish., 16, no. 8, p. 55, 57, 59.

Methods of fishing and gear; processes in packing; manufacture of tins.

own, *C. M.*

1930. Canning sardines on the Monterey peninsula. West Coast Fish., New Year's No., p. 62–63.

History of canning industry at Monterey; fishing and canning methods described.

unchorst, *J.*

1898. Norges fiske deres udbredelse og levevis. Bergen, p. 49.

Clupea pilchardus: short description.

ünnich, *Morten Thrane.*

1768. Ichthyologia Massiliensis, sistens piscium descriptiones eorumque apud incolas nomina. Accedunt spoila maris Adriatici. p. 82.

Sardine: description.

yant, *Harold Child.*

1924. Scientific investigation by the California fish and game commission. Calif. Fish Game, 10, no. 2, p. 59.

Sardine investigation to be carried on by California State Fisheries Laboratory, Terminal Island, California.

ıchanan-Wollaston, *H. J.*

1911. Report on the results of the fish-egg cruise made by the S. S. "Huxley" in June, 1909. Mar. Biol. Assoc., Intern. Fish. Invest. (Southern Area), 3. Rept. [for 1906–1908] p. 213, 216.

Clupea pilchardus eggs: description; where taken in English Channel; number taken; p. 234, literature cited (on fish eggs in general).

ıckland, *Francis Trevelyan.*

1881. Natural history of British fishes; their structure, economic uses, and capture by net and rod. Cultivation of fish-ponds, fish suited for acclimatisation, artificial breeding of salmon. London, p. 162–165.

Clupea pilchardus: short description; English methods of cooking and curing; methods of catch.

ıckland, *Francis Trevelyan,* and **Walpole,** *Spencer.*

1879. Report on the sea fisheries of England and Wales. London, p. 197–198, 242.

Statistics of pilchard fishery; spawning; pelagic eggs.

ıen, *Fernando de.*

1916. Sobre fauna ictiológica guipuzcoana. Soc. Española Hist. Nat., Bol., 19, no. 9, p. 478, 496.

Alosa pilchardus listed from Guipuzcoa, Spain.

1919.1. Instrucciones para el estudio de los Clupéidos. Bol. Pescas, 4, no. 29, p. 19, 2 figs.

Clupea pilchardus: instructions for taking proportional measurements and other characteristics.

1919.2. Algunos datos sobre la sardina de Vigo (*Clupea pilchardus* Walb.). (Julio, Agosto y Septiembre de 1918.) Bol. Pescas, 4, no. 30, p. 45–65, 20 figs.

Description of "branquispines"; food; weight-length relationship.

1919.3. Métodos seguidos en la investigación de las escamas de sardina (*Clupea pilchardus* Walb.). Bol. Pescas, 4, no. 30, p. 67–75, 5 figs.

Methods of studying sardine scales for the purpose of aging.

Buen, *Fernando de*—Continued.

1919.4. Las costas sur de España y su fauna ictiológica marina. Bol. Pescas, no. 37–38, p. 268.

Clupea pilchardus: synonomy; distribution.

1922.1. Correspondencia científica de los nombres vulgares empleados en l memorias estadísticas de Baleares y costas vascas. Bol. Pescas, no. 65–67, p. 30, 32. *Also in* La pesca marítima en España en 192 Madrid, 1923, 2, p. 154, 156.

Clupea pilchardus called "sardina" in Spain.

1922.2. Costa sud-atlántica y Canarias. Bol. Pescas, 7, no. 76, p. 362–374. *A in* La pesca marítima en España en 1920. Madrid, 1923, 1, p. 22–34.

Species caught with sardine; size of sardine; fishing areas; migratio preserving and canning methods; condition of fishery; statistics.

1924. La biologie de la sardine en Galicie (Espagne). Acad. Sci. Paris, C. 178, p. 2125–2127. *Reviewed by* Joubin *in* Pêch. Marit., 1924, 7, no. 5 p. 613.

Spawning; migrations; method of reading scales for age (L method).

1925. Estudio de la edad por las escamas en sardinas (*Clupea pilchardus* Walt de Vigo. Spain Inst. Español Oceanogr., Not. Res., ser. 2, no. 8, 31 p 32 text figs., 2 pls.

Age of sardine determined by the scales; literature cited.

1926.1. Une mutation de la *Sardina pilchardus* (Walbaum)? Soc. Zool. Fran Bull., 51, no. 3, p. 229–231, 1 fig.

Variation: large caudal fin.

1926.2. Catalogo ictiológico del Mediterraneo español y marruecos. Spain In Español Oceanogr., Res. Camp., no. 2, p. 47.

Sardina pilchardus: synonomy; common names of Mediterranean.

1927.1. Notas sobre la biología del atún y de la sardina. Bol. Pescas, 12, no. 1 p. 229–236.

Races of European sardines; life history; sexual maturity at differ seasons; bibliography.

1927.2. Sustitución alternativa de la especies emigrantes. Bol. Pescas, 12, 135, p. 337–341. *Reviewed in* Biol. Abst., 1930, 4, no. 2, item 6497.

Sardina pilchardus: fluctuation in fishery at Vigo; alternating w other fishes in abundance.

1927.3. Notas preliminares sobre la biología de la sardina. Spain Inst. Espa Oceangr., Not. Res., ser. 2, no. 15, 56 pp., 7 figs.

Sardina pilchardus: systematic relationships; synonomy; description eggs and larvae; keys for identification of eggs and larvae recen hatched and at three larger stages; races; sexual dimorphism; spawn season; temperature of water at spawning; spawning area; size of mat sardines; nomenclature of stages of development; growth; metamorp sis; proportion of young to adults; food of young sardines; literat cited; figures of 39 mm. and 55 mm. fish and sections to show pigmen tion at five different stages.

1927.4. Notes et bibliographie sur la biologie de la sardine. Cons. Explor. M P. V., 44, p. 108–114.

Sardina pilchardus: European races defined; progress of sexual mat ity; relation between temperature of water and spawning; vertical d migrations; food; bibliography.

1928.1. Biología y pesca de la sardina, *Sardina pilchardus* (Walbaum). Lugares y épocas de pesca. Bol. Pescas, 13, no. 140, p. 101–116.

Distribution of *Sardina pilchardus, S. sagax, S. neopilchardus;* a and seasons of fishery of European countries; statistics.

1928.2. Biología y pesca de la sardina, *Sardina pilchardus* (Walbaum). Pesca con cerco real. Bol. Pescas, 13, no. 145, p. 261–269.

Description of gear and history of regulations governing it in Sp (See Chute, 1929.1, for partial translation into English.)

:n, *Fernando de*—Continued.

929.1. *Sardina pilchardus. In* Faune et flore de la Méditerranée. Commission Internationale pour l'Exploration de la Mer Méditerranée. Paris.

Description; distribution; figure of egg larva and adult.

929.2. Fluctuaciones en la sardina, *Sardina pilchardus* (Walb.). [Summary in French.] Spain Inst. Español Oceanogr., Not. Res., ser. 2, no. 35, p. 1–80. French summary *also in*: Cons. Explor. Mer, P. V., 1930, **65,** p. 84–99. *Reviewed in* Pêch. Marit., 1930, **13,** no. 619, p. 211.

Study of the fluctuations of the sardine fisheries of Europe; statistics; weight-length studies; graphs.

929.3. Étude des sardines des côtes d'Espagne. Cons. Explor. Mer, P. V., **54,** p. 42–45. *Reviewed in* Pêch. Marit., 1929, **12,** no. 585, p. 502–503; no. 586, p. 516.

Résumé of knowledge of life history of Spanish sardine: spawning; growth; temperature of water; short list of literature.

929.4. Note sur de phénomènes d'alternance dans la pêche des poissons migrateurs. Cons. Explor. Mer, P. V., **62,** p. 91–98.

Alternating of sardine with other fisheries.

929.5. La alternancia en la pesca de peces emigrantes. Spain Inst. Español Oceanogr., Trab., no. 1, p. 1–25.

Abundance of sardine seeming to alternate with other fish (*Engraulis encrassicholus, Trachurus trachurus, Clupea sprattus*).

930. Clupéidés et leur Pêche. Comm. Explor. Méditerranée, n.s. **5,** p. 171–177, 182–194.

Sardina pilchardus: key to identify egg, larva and adult; synonomy; description of egg larva and adult; egg in five stages of larvae figured; bibliography.

en, *Odón de.*

910. Datos para la fauna de la costa catalana. Spain Mar. Merc. Pesc., An. Estadís. [for 1909] p. 160, 164.

Clupea pilchardus listed with Spanish common name; list of numbers taken, with lengths and dates of capture.

912.1. Notas sobre biología y aprovechamiento de Mar Chica (Melilla). Spain Mar. Merc. Pesca., An. Estadís. [for 1911] p. 11.

Clupea pilchardus listed.

912.2 Peces de la costa mediterránea de Marruecos. (Notas preliminares.) Soc. Española Hist. Nat., Bol., **12,** no. 3, p. 157.

Clupea pilchardus listed.

916. Campaña "Hernán Cortés" este verano. Bol. Pescas, **1,** no. 3, p. 9.

Sardine: sexual maturity.

923. Ideas generales y resumen. *In* La pesca marítima en España en 1920. Madrid, **1,** p. xxviii–xxx.

Statistics of sardine fishery in Spain.

en, *Rafael de.*

927. An account of the work which Spain has carried out in the Atlantic Ocean and the Straits of Gibraltar. Cons. Explor. Mer, Journ., **2,** no. 3, p. 281–303.

Clear account of knowledge of sardine in Spain; sardine statistics (Spain); frequency curves for total length; relation between length to weight, height and width; these questions discussed and presented in graphs; migrations; spawning; study of age by means of scales; sexual development.

l, *Henrik,* and **Säther,** *Lief.*

910. Kann man die Natur des zur Herstellung von Ölsardinen verwendeten Pflanzenöles erkennen? Chem. Zeit., **34,** no. 82, p. 733–734.

Tests of oil used in canning Norwegian sardines.

Bullen, *Frank T.*

1904. Denizens of the deep. New York, p. 207–301, 306–307.

Clupea pilchardus: short account of English fishery and industry, an distribution of product.

Bulletin Trimestriel de l'Enseignement Professionnel et Technique des Pêche Maritimes.

1911.1. La fermeture des boîtes à sardines. La question du sertissage et de soudre. Bull. Trim. Pêch. Marit., **16**, no. 1, p. 112–115.

Discussion and correspondence concerning conflict over substituti machines for hand-soldering sardine tins.

1911.2. Le congrès des marins sardiniers de France. Bull. Trim. Pêch. Mari **16**, no. 2, p. 528–536.

Sardine fishery of France; bait; cooperation of fishermen and cre arrangement.

1912.1. Sardines et sprats. Un jugement intéressant. Bull. Trim. Pêch. Mari **17**, no. 2, p. 275–276.

English decision with regard to labeling sprats as sardines.

1912.2. Les sardiniers bretons. Pêche de la sardine et du thon à Concarneau et Douarnenez. Sardines françaises et sardines américaines. Comment apprêtait les sardines en 1772. Bull. Trim. Pêch. Marit., **17**, no. 3, 519–523, 524–526.

Conditions of French sardine fishery; differences between Maine (S. A.) and French sardine (species and manner of packing and price recipes, for preparation of sardines, taken from Duhamel du Moncea 1772.

1913.1. Congrès extraordinaire de la fedération syndicale des pêcheurs et sa diniers de France tenu à Nantes les 25 et 26 janvier, 1913. Bull. Tri Pêch. Marit., **18**, no. 2, p. 423–439.

Report of congress on regulations for sardine fishing and canning.

1913.2. Procès-verbaux des réunions tenues au ministère de la marine 25, 26, 27 février et 13 mars, 1913 par les représentantes des pêcheurs des fabricants de conserves. Bull. Trim. Pêch. Marit., **18**, no. 2, 440–455.

Proceedings of meetings of canners and fishermen with regard to pric paid to latter for sardines.

1913.3. Congrès des pêcheurs sardiniers tenu à Lorient les 1, 2 et 3 décembr 1913. Bull. Trim. Pêch. Marit., **18**, no. 4, p. 857–883.

Report of congress on improvement of prices; regulation of facto conditions; fishing; destruction of cetaceans.

C

C., *J.*

1826. Cheap and durable fish oil paint. Mechanics Mag., **6**, no. 170, p. 4

Recipe for making pilchard oil into paint.

Caiger, *Herbert.*

1905. Case of poisoning from tinned sardines; coma; necropsy. Brit. Med. Jour **2**, p. 928.

A fatal case of poisoning as result of eating canned sardines; sy toms and treatment given.

Caillo, _____.

1855. Recherches sur la pêche de la sardine en Bretagne, et sur les industries s'y rattachent. Nantes, 96 pp.

Clupea sardina: disappearance; résumé of life history; nomenclatu methods and gear; preservation of products.

Calder, *J. F.*

1916. The sardine canning industry. Canadian Fish., **3**, p. 171–173, 200–202.

Process of canning sardines, east coast of Canada.

derón, *Salvador.*

889. Peces de las pesquerías andaluzas existentes en el gabinete de la Universidad de Sevilla. Soc. Española Hist. Nat., An., **18,** p. 126.
Clupea sardina listed.

ifornia Bureau of Commercial Fisheries.

929.1. California fresh fishery products for the months of July, 1928–June, 1929. Calif. Fish Game, **15,** p. 94, 96, 188, 190, 296, 298, 358–360.
Sardine statistics.

929.2. Tables showing the monthly catches landed in California by districts for the two calendar years 1926 and 1927. *In* The commercial fish catch of California for the years 1926 and 1927. Calif. Div. Fish Game, Fish Bull., no. 15, p. 64–87.
Sardine statistics.

930.1. California fresh fishery products for the months of July, 1929–June, 1930. Calif. Fish Game, **16,** p. 102, 104, 196, 198, 274, 276, 378, 380.
Sardine statistics.

930.2. Monthly catches landed in California by districts for 1928. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish Game, Fish Bull., no. 20, p. 90, 94–97, 99, 101, 103, 106.
Sardine statistics.

lifornia Department of Commercial Fisheries.

916. Table showing amount of fish, crustaceans and mollusks taken in California waters for three months ending December 31, 1915; March 31, 1916. Calif. Fish Game, **2,** p. 102, 103, 166.
Sardine statistics.

917. Reports. Calif. Fish Game, **3,** no. 1, p. 44, 46; no. 2, p. 93; no. 3, p. 143; no. 4, p. 187.
Sardine statistics.

919.1. Reports. California fishery products—July, 1918 to June, 1919. Calif. Fish Game, **5,** p. 45, 101, 145, 164, 167, 208.
Sardine statistics.

919.2. Canned, cured and manufactured fishery products of California for the year 1918. Calif. Fish Game, **5,** no. 4, p. 162.
Canned sardine statistics.

920.1. California fresh fishery products—July, 1919 to June, 1920. Calif. Fish Game, **6,** p. 41, 91, 94, 184.
Sardine statistics.

920.2. Canned, cured and manufactured fishery products of California for the year 1919. Calif. Fish Game, **6,** no. 2, p. 96, 97. *Also in* Pacific Fish., 1920, **18,** no. 4, p. 70, 71.
Sardine statistics.

921. California fresh fishery products, July, 1920–June, 1921. Calif. Fish Game, **7,** p. 70, 130, 272.
Sardine statistics.

921+. California fishery products for year 1918–1919. Calif. Fish Game Comm., *in each* Bienn. Rept. beginning with 26th for 1918–1920. Current.
Sardine statistics.

922. California fresh fishery products for months of July, 1921–June, 1922. Calif. Fish Game, **8,** p. 58, 138, 194, 244.
Sardine statistics.

923.1. Canned, cured and manufactured fishery products of California for the year 1921. Pacific Fish., **21,** no. 1, p. 38.
Sardine statistics.

California Department of Commercial Fisheries—Continued.

1923.2. California fresh fishery products for months of July, 1922–June, 1923. Calif. Fish Game, **9**, p. 38, 80, 126, 178.

Sardine statistics.

1924. California fresh fishery products for months of July, 1923–June, 1924. Calif. Fish Game, **10**, p. 48, 100, 154, 204.

Sardine statistics.

1925. California fresh fishery products for months of July, 1924–June, 1925. Calif. Fish Game, **11**, p. 46, 94, 146, 192.

Sardine statistics.

1926. California fresh fishery products for months of July, 1925–June, 1926. Calif. Fish Game, **12**, p. 50, 114, 158, 214.

Sardine statistics.

1927. California fresh fishery products for months of July, 1926–June, 1927. Calif. Fish Game, **13**, p. 74, 160, 230, 302.

Sardine statistics.

1928.1. Report on sardine canneries 1926–27. Calif. Fish Game, **14**, no. 1, p. 95–96.

Statistics of California sardine canneries.

1928.2. California fresh fishery products for the months of July, 1927–June, 1928. Calif. Fish Game, **14**, p. 102, 104, 188, 190, 260, 262, 326, 328.

Sardine statistics.

California Fish and Game.

1916.1. New fish cannery on San Diego Bay. Calif. Fish Game, **2**, no. 1, p. 40.

Notice of a new sardine cannery starting to operate.

1916.2. Fish cannery statistics. Calif. Fish Game, **2**, no. 3, p. 153.

Sardine statistics; amounts canned in California, 1915.

1917. Millions of pounds of sardines canned. Calif. Fish Game, **3**, no. 4, p. 167.

Increasing output of California sardine industry.

1920. Naval air station fish patrol opens idle canneries. Calif. Fish Game, **6**, no. 2, p. 71–72.

Cooperation between naval airplane service and canneries; location of sardine schools by airplane scouts.

1921. A sardine number. Comparison of sardine catch. Calif. Fish Game, **7**, no. 4, p. 261–262.

Editorial comment on this number of the magazine; comparison of sardine catch and value of California, Maine, Portugal, France and Norway for 1919.

1922.1. Fisheries conference meets at San Pedro. Calif. Fish Game, **8**, no. 2, p. 125.

General outline of research program for California sardine.

1922.2. Hearings held on use of food fish in reduction plants. Calif. Fish Game, **8**, p. 186.

Sardine canneries closed for 90 days as penalty for reduction of fish in excess of amount allowed by law.

1924.1. February nets large catch of sardines. Calif. Fish Game, **10**, no. 3, p. 131.

Sardine fishery statistics.

1924.2. Commission will appeal decision. Calif. Fish Game, **10**, no. 4, p. 189.

Litigation in connection with reduction of sardines to fertilizer.

1928. Division activities. Calif. Fish Game, **14**, no. 3, p. 233.

August 6 set for opening date for 1928 sardine season in Monterey, California.

1929.1. Sardine litigation. Calif. Fish Game, **15**, no. 2, p. 133–134.

Record of three cases in California concerned with reduction of sardines to fertilizer.

ifornia Fish and Game—Continued.

929.2 First discovery of sardine eggs. Calif. Fish Game, **15**, no. 3, p. 248.
First discovery of sardine eggs by E. C. Scofield, June, 1929, five miles off coast of southern California.

929.3. An act regulating the packing of sardines in Maine. Calif. Fish Game, **15**, no. 3, p. 281.
Regulations for quality of canning "sardines" (small herring); license for canneries. (Taken from U.S.D.C., Fish. Sci. Trade, 1929, 1, no. 5.)

930.1. Menace of floating reduction plants. Calif. Fish Game, **16**, no. 1, p. 62.
Boats to operate outside three-mile limit in order to evade sardine reduction laws.

930.2. Bureau of commercial fisheries. Calif. Fish Game, **16**, no. 1, p. 70.
Cannery and market conditions; lampara operators make gear into modified purse seine for sardines.

ifornia Fisheries.

929.1. Saving the sardine. Calif. Fish., **1**, no. 6, p. 12–13.
Problems still unsolved in connection with life history and conservation of sardine.

929.2. Sardines wreck boat and eight fishermen. Calif. Fish., **1**, no. 8, p. 21.
Accident caused by large school sounding in net.

929.3. Sardine operations at an end for season of 1928–1929. Calif. Fish., **1**, no. 9, p. 7.
Sardine season at Monterey.

929.4. The season's sardine catch at Monterey breaks all previous records. Calif. Fish., **1**, no. 10, p. 5.
Sardine season at Monterey; statistics.

alifornia] State Fish Exchange.

928. Five hundred ways to cook California sea food. Sacramento, p. 86.
Recipes for cooking sardines.

lifornia Supreme Court.

924. The people of the state of California vs. Monterey fish products company (a corporation). Appellants opening brief. San Francisco, 25 pp.
Proceedings in litigation concerning reduction of sardines to fertilizer.

lléja, _____.

930. La coopérative des pêcheurs de Chiffalo. Sta. Aqui. Pêch. Castiglione, Bull. [for 1929] p. 121–125.
Description of cooperative organization of sardine fishermen and canneries.

nada. Dominion Bureau of Statistics.

Fisheries statistics of Canada.
Annual report containing sardine statistics.

nada. Fisheries Branch.

Annual report.
Statistics of sardine fishery of Canada.

nadian Fisherman.

919. The Canadian sardine and herring industry. Canadian Fish. **6**, p. 369–378.
Methods of fishing and canning in Canada. (English, French and Spanish text in parallel columns.)

928. Pilchard reduction, a great industry. Great runs of fish in the season. Canadian Fish., **15**, no. 12, p. 27.
Industry of British Columbia.

929.1. B. C. pilchard meal and oil industry is flourishing. Holland uses oil for margarine. California takes bulk for meal. Canadian Fish., **16**, no. 2, p. 35.
Oil and meal industry of British Columbia.

Canadian Fisherman—Continued.

1929.2. Investigate pilchard and herring for intelligent regulation. Canadian Fish., **16**, no. 5, p. 33.

Canadian federal government to cooperate with British Columbia.

1929.3. Pilchard and herring to be surveyed. Canadian Fish., **16**, no. 8, p. 31.

Commission appointed: federal government of Canada represented by Dr. W. A. Clements, and British Columbia by Hon. J. P. Babcock; Dr. John L. Hart in actual charge of investigations.

1929.4. Pilchard fishing starts. Canadian Fish., **16**, no. 8, p. 31.

Beginning of season in British Columbia.

1929.5. Margarine out of B. C. pilchard oil. Shipments to Europe. Canadian Fish., **16**, no. 10, p. 31.

Notice of shipments.

1930. B. C. fishing regulations revised by federal government. Changes affecting pilchard, herring and salmon fisheries. Canadian Fish., **17**, no. 3, p. 32.

Decision to make July 5 opening date for pilchard season; closing date not mentioned.

Candace, *Gratien.*

1927. Les incidents sardiniers de 1926 et leur solution. Pêch. Marit., **10**, no. 466, p. 273–274.

Quarrels and settlement of French sardine fishing controversy.

Canestrini, *Giovanni.*

1871. Pesci d'Italia. *In* Fauna d'Italia, *by* Emilio Cornalia. Milano, pt. 3, p. 134.

Alosa sardina: description; Italian common names.

Canning Trade.

1914. A complete course in canning. Baltimore, p. 210.

Methods for sardine canning.

Canu, *E.*

1908. Conclusions du rapport de M. Canu, sur la crise sardinière. *In* Documents relatifs à la crise sardinière, 1903–1907. France Min. Mar., annexe no. 1, p. 20–21.

Recommedations for improving conditions.

1912. Rapport . . . sur la crise sardinière adopté par le comité consultatif des pêches présidé par M. Gerville-Réache, député. *In* Documents concernant la crise sardinière. 1903 à 1912. Réunis par Louis Amieux. Nantes, 1. fasc., p. 28–29.

Suggestions for improving sardine situation.

Caraffa, *Tito de.*

1902. Essai sur les poissons des côtes de la Corse. Soc. Sci. Hist. Nat. Corse Bull., **22**, p. 147–148.

Alosa sardina: description.

1929. Les poissons de mer et la pêche sur les côtes de la Corse. Paris, 2. ed., p. 211–212, 287–290.

Alosa sardina: common names of southern Europe; description; fishing methods and gear.

Carew, *Richard.*

1811. Carew's survey of Cornwall. London, p. 100–105.

Methods of fishing and gear; methods of preservation; enemies of pilchard.

Carlson, *G.*

1921. Further comment on sardine competition. Pacific Fish., **19**, no. 7, p. 4.

Comparative quality of pilchard, herring and sprat; letter from North Shields, England.

rus, *Julius Victor.*

1889. Prodromus faunae mediterraneae sive descriptio animalium maris Mediterranei incolarum quam comparata silva rerum quatenus innotuit adiectis locis et nominibus vulgaribus eorumque auctoribus in commodum zoologorum. Stuttgart, 1889–1893, **2**, p. 552.

Clupea pilchardus: synonomy; description; distribution; common names of Europe.

ssigneul, *P.*

1928. La recherche des bancs de sardines par hydravions. Pêch. Marit., **11**, no. 536, p. 563.

Suggestions for discovering sardine schools by hydroplane.

stillo, *Luis.*

1912. Fabricación de la sardina en aciete. Boletin Bosques, Pesca i Caza, Santiago, **1**, p. 338–346.

Clupea sajax: methods of canning in Chile.

stlenau, *(Comte) François L. de Laporte de*

1861. Mémoire sur les poissons de l'Afrique australe. Paris, p. 67–68.

Clupea ocellata: description.

1872. Contribution to the ichthyology of Australia. R. Zool. Acclim. Soc. Victoria, Proc., **1**, p. 187–188.

Clupea sajax: description; synonomy.

1878. Essay on the ichthyology of Port Jackson. Linnean Soc. New S. Wales, Proc., **3**, p. 355.

Clupea sagax recorded.

athcart, *E. P.*

1906. The bacterial flora of "blown" tins of preserved food. Journ. Hyg., **6**, p. 248–250.

Bacteriological study of sardines.

aye, *Georges.*

1903. La fabrication des boites de sardines. Nature, Paris, 2. sér., **10**, p. 199–202.

Methods of canning in France.

ederström, *Carl.*

1876. Anteckningar om norra Bohusläns Vertebratfauna. Svenska VetAkad., Öfver., **33**, no. 4, p. 66.

Clupea pilchardus listed.

épède, *Casimir.*

1907. Contribution à l'étude de la nourriture de la sardine. Quelques remarques sur la nourriture de la sardine. Assoc. Franç Avanc. Sci., C. R., 36. sess., pt. 1, p. 263–267.

Food of sardine.

1908. Observations et remarques sur la nourriture de la sardine. Assoc. Franç. Avanc. Sci., C. R., 36. sess. [for 1907] pt. 2, p. 774–778.

Food; parasites (copepods and nematodes).

1910.1. La nourriture des sardines adultes de Star-Point. Cong. Pêch. Marit., Sables-d'Olonne, C. R. [for 1909] **1**, p. 150–152.

Food of sardines of Start Point, Devonshire; parasites.

1910.2. La nourriture des sardines adultes des San-Sébastien. Cong. Pêch. Marit., Sables-d'Olonne, C. R. [for 1909] **1**, p. 154–160.

Food of sardines of San-Sébastien, Spain.

eylon. Marine Biologist.

1930. Administration report. Colombo, July, 1 graph.

Graph showing amounts of sardines taken in 1928 and 1929.

Chabanaud, *Paul.*

1926. Sur les Clupéidés du genre *Sardina* Antipa et de divers genres voisins. Soc. Zool. France, Bull, **51**, p. 156–163, 9 figs.

Reclassification of *Sardina* as given by Regan according to Antipa (1906) on basis of anatomy of hyobranchial apparatus; genera discussed: *Clupeonia, Sardinella, Amblygaster;* species of *Sardina* recognized: *Sardina pilchardus, S. sardina, S. neopilchardus, S. sajax.*

Chauvin, *Louis.*

1909. Où en est la crise sardinière. Bull. Trim. Pêch. Marit., **14**, no. 2, p. 616-621.

Sardine failure from industrial point of view; improvement of methods of selling fish to canneries, and of canning.

Chester, *John.*

1835. Essay on the pilchard [*Clupea pilchardus*]. R. Cornwall Polytech. Soc., Ann. Rept., **3**, p. 102–107.

Description of pilchard migrations; season of appearance on English coast; food.

Christo, *George J.*

1931. California oval pack. West Coast Fish., March, p. 21, 25.

Food values of sardines; statistics of pack from 1912 to 1930.

Chute, *George Roger.*

1929.1. The Spanish cerco real or "royal blockade net." An ancient sardine gear. Calif. Fish Game, **15**, no. 2, p. 118–124.

Description of ancient Spanish net, taken from Buen, Fernando de (1928.2); regulations of fishery in 1750.

1929.2. Monterey fleet of pilchard seiners cruises outside the bay. The hundred-ton diesel-driven, turntable craft run north to the "Frisco Bar" for fish. West Coast. Fish., Dec., p. 7, 28-29.

Extension of sardine fishing area in northern California.

1930. A quest for the eggs of cannery fish. West Coast Fish., April, p. 40.

Progress and plans for sardine research of California State Fisheries Laboratory.

Clark, *E. D.*, and Clough, *R. W.*

1926. Chemical composition of fish and shellfish. *In* Nutritive value of fish and shellfish, *compiled by* Harry R. Beard. U. S. Comm. Fish., Rept. [for 1925] (Doc. 1000), p. 508, 518.

Sardine: chemical composition.

Clark, *E. D.*, and Davi, *H. D.*

1918. Preservation of sardines by smoking. Pacific Fish, **18**, no. 10, p. 25, 56, 58, 60.

Methods of smoking clearly described and costs given in detail.

Clark, *Frances Naomi.*

1928. The weight-length relationship of the California sardine (*Sardina caerulea*) at San Pedro. Calif. Div. Fish Game, Fish Bull., no. 12, 59 pp., graphs, tables. *Reviewed in* Nature, London, 1929, **124**, no. 3128, p. 596; *and in* Cons. Explor. Mer, Journ., 1929, **4**, no. 1, p. 118–119; no. 2, p. 226–229

Statistical methods described; a list of 85 titles on general subject of weight-length relationship.

1930.1. Fishing localities off San Pedro from 1919 to 1929 for the California sardine (*Sardina caerulea*). *In* Fishing areas along the California coast for the sardine (*Sardina caerulea*). Calif. Div. Fish Game, Fish Bull., no. 25, p. 28-39.

Fishermen have to go farther than formerly, showing decline of inshore fishery; statistics; maps; graphs.

1930.2. Seasonal changes in the daily average length of the California sardine, *Sardina caerulea.* Calif. Div. Fish Game, Fish Bull., no. 26, 20 pp.

Seasons from 1919–1929 studied; an average of larger fish for last five years probably due to fish that have grown to maximum size; statistics; graphs; literature cited.

ark, *Frances Naomi*—Continued.

1931. Dominant size-groups and their influence in the fishery for the California sardine (*Sardina caerulea*). *In* Studies of the length frequencies of the California sardine (*Sardina caerulea*). Calif. Div. Fish Game, Bull., no. 31, p. 1–42.

Length studies and their bearing on prediction of fishery.

ark, *Robert S.*

1914. General report on the larval and post-larval teleosteans in Plymouth waters. Mar. Biol. Assoc., Journ., n. s., **10**, no. 2, p. 338–339.

Clupea pilchardus: larval stages.

1920. The pelagic young and early bottom stages of teleosteans. Mar. Biol. Assoc., Journ., n. s., **12**, no. 2, p. 176–180, 239–240.

Sardina pilchardus: number of hauls; sizes of fish; depths of catch; bibliography.

ligny, *Adolphe.*

1913. Sardines et pseudo-sardines. Contribution à l'histoire de la pêche et de l'industrie sardinière. Sta. Aqui. Boulogne-sur-Mer, Ann., n. s., **3**, 27 pp. *Also in* Bull. Trim. Pêch. Marit., 1913, **18**, no. 2, p. 281–315.

Synonomy; classification; common French names (derivation); history of fishery and of canning and preserving sardines; bibliography on sardine in general; list of sardine references in Bull. Trim. Pêch. Marit. from 1901–1912.

1914. Documents relatifs à l'histoire de la pêche sardinière. Soc. Acclim. France, Bull., **61**, no. 16, p. 513–531.

Study of historical documents relating to French sardine fishery.

1919. La sardine dans le Pas-de-Calais. 6. Cong. Nat. Pêch. Marit., Tunis, C. R., **1**, p. 84–91.

Spawning season; size of fish.

loarec, *Paul.*

1913. Rapport sur la crise sardinière en 1912. Bull. Trim. Pêch. Marit., **18**, no. 2. p. 325–339.

Economic conditions in French sardine fishery; suggestions for increasing yield of fishery and bettering conditions in industry. (For discussion of this report, see p. 351 of this number, meetings of February 15 and March 6.)

obb, *John N.*

1902. Commercial fisheries of the Hawaiian Islands. U. S. Comm. Fish., Rept. [for 1901] p. 441–442, 446, 449, 450.

Sardine importations and statistics.

1918. Increasing our Pacific coast fishery resources. Calif. War Papers, Sacramento, p. 4–5.

Statistics of California sardine fishery.

1919. The canning of fishery products. Seattle, p. 78–98.

Sardine canning methods (California and Maine).

ockerell, *Theodore Dru Alison.*

1914. Observations on fish scales. U. S. B. F., Bull. [for 1912] **32**, p. 123–124, pl. 35, fig. 18.

Clupanodon pilchardus and *C. pseudohispanicus:* scale structure.

1915. The scales of some Australian fishes. Queensland Mus., Mem., **3**, p. 36.

Description of scales of *Amblygaster neopilchardus* from Queensland.

oker, *R. E.*

1821. Progress in biological inquiries. U. S. Comm. Fish., Rept. [for 1920] (Doc. 896), p. 11.

Investigation on occurrence of *Sardinia caerulea* off coasts of Washington and Oregon shows that a big packing industry would not be practical.

Collett, *Robert.*

1875. Norges fiske, med bemaerkninger om deres udbredelse. Christiania, p. 194.
Clupea pilchardus: description.

1896. Poissons provenant des campagnes du yacht "L'Hirondelle" (1885–1888). *In* Resultats des campagnes scientifiques accomplies sur son yacht par Albert I, Prince Souverain de Monaco. Monaco, fasc. 10, p. 137–138.
Clupea pilchardus: description; distribution.

Collins, *James H.*

1924. The story of canned foods. New York, p. 122–128.
Sardine canning in France and United States.

Collins, *J. W.*

1892. Report on the fisheries of the Pacific coast of the United States. U. S. Comm. Fish., Rept. [for 1888] p. 36, 44, 50, 57, 121, 123, 141, 158–159, 248.
Season of appearance at different localities; *Clupea sajax* identical with European sardine; statistics; beginning of canning industry in California.

Collins, *W. Wilkie.*

1851. Rambles beyond railways. The pilchard fishery on the coast of Cornwall. London, p. 146–164. *Also in* Harper's Mag., 1851, 2, p. 630–633.
English methods of fishing and gear; methods of preserving—graphic description.

Congrès National des Pêches Maritimes.

1908. Excursion à Biarritz. Cong. Nat. Pêch. Marit., Bordeaux, p. 543.
Sardine statistics.

Conner, *Geraldine.*

1931. California's fishing boat census for 1929. *In* The commercial fish catch of California for the year 1929. Calif. Div. Fish Game, Fish Bull., no. 30, p. 87–92.
Development and changes in sardine fishing boats.

Conseil Permanent International pour l'Exploration de la Mer.

+. Bulletin statistique des pêches maritimes. Copenhague. (Annual.)
Statistics of the sardine fisheries of England in each issue starting with vol. 1 for 1903–1904, printed in 1906.

Cornalia, *Emilio.*

1875. Sulla *Taphrobia pilchardi*, nuovo genere di crostacei parassiti. Soc. Ital. Sci. Nat., Atti, 18, 2. fasc., p. 197–200.
Description of sardine parasite (crustacean).

Cornide, *Joseph.*

1788. Ensayo de una historia de los peces y otras producciones marinas de la costa de Galicia, arreglado al sistema del caballero Cárlos Linneo. Madrid, p. 91–94.
Sardine fishery of Galicia.

Cornish, *Thomas.*

1870. Pilchards in Mount's bay on Christmas Day. Zoologist, 5, p. 2027.
Clupea pilchardus: late season for this locality.

1872. Great abundance of pilchards [*Clupea pilchardus*] on the Cornish coast. Zoologist. ser. 2, 7, p. 2908.
Short note on above topic.

Cornish, *Thomas*—Continued.

1879. Large pilchard. Zoologist, **3**, p. 62.

11-6/8 inch specimen; locality undetermined.

1880. Late stay of pilchards and early arrival of mackerel on the Cornish coast. Zoologist, **4**, p. 112–113.

Unusually long pilchard season.

1881. Pilchards on Cornish coast. Zoologist, **5**, p. 387.

Record of pilchards being taken in full roe (July 19, 1881).

1883.1. Mackerel and pilchard fisheries. Intern. Fish. Exhib. Lit., Conferences, **6**, pt. 3, p. 109–146.

Popular account of pilchard fishery of Cornwall.

1883.2. Migrations of the pilchard. Zoologist, ser. 3, **7**, p. 431.

1883.3. Habits of the pilchard. Zoologist, ser. 3, **7**, p. 505–506.

Habits.

Couch, *Jonathan.*

1835. Essay on the pilchard [*Clupea pilchardus*]. R. Cornwall Polytech. Soc., Ann. Rept., **3**, p. 65–101.

Clupea pilchardus: compared with herring; spawning season; food; methods of fishing in Cornwall; methods of preservation; wages of fishermen; laws regulating fishery in Cornwall; extent and value of property employed in fishery; statistics, 1747 to 1826; conditions of fishery from 1815 to 1834, year by year.

1840. Observations in further illustration of the history and statistics of the pilchard fishery. R. Cornwall Polytech. Soc., Ann. Rept., p. 11–26.

Notes on Cornish pilchard fishery in 1728; ledger of Richard Trevill (1594) quoted at length to show how a merchant of Plymouth was attempting to take the trade out of the hands of the merchants of London.

1867. A history of the fishes of the British Islands. London, **4**, p. 79–94.

Clupea pilchardus: colored plate; synonomy; distribution; description; habits; spawning; growth; food; fishing methods and gear of England; methods of preservation; use in heraldry.

Coudures, *M. E.*

1918. De l'analyse des huiles dans les conserves de sardines. Société de Pharmacie de Bordeaux, Bull., no. 3, p. 164–176. *Reviewed by* Colomb-Pradel, E., *in* Revue Franç. Cons. Aliment., 1919, **3**, no. 27, p. 619–620.

Analysis of oils used in sardine canning.

Courtenay, *J. S.*

1837. A treatise on the statistics of Cornwall. R. Cornwall Polytech. Soc., Ann. Rept., **5**, p. 114–133.

Quotation from Carew (1811) on methods of fishing and preserving; statistics of Cornwall pilchard fishery from 1777–1837.

1840. Statistics of the pilchard fishery, for the years 1838 and 1839. R. Cornwall Polytech. Soc., Ann. Rept., p. 27–34.

Condition of fishery; statistics.

Crowell, *A. Russell.*

1918. Commercial fishes of the Mexican west coast. Pacific Fish., **16**, no. 8, p. 53.

Sardines abundant.

Cunningham, *Joseph Thomas.*

1888. Spawn of the pilchard. Mar. Biol. Assoc., Journ., **1**, p. 247–248.

Description of eggs hatched under observation, possibly of pilchard.

1889. Studies of the reproduction and development of teleostean fishes occurring in the neighborhood of Plymouth. Mar. Biol. Assoc., Journ., n.s., no. 1, p. 38–45, pl. 5, figs. 28–30.

Spawning of sardine; larvae described and figured.

Cunningham, *Joseph Thomas*—Continued.

1891. The reproduction and growth of the pilchard. Mar. Biol. Assoc., Journ., n.s., **2**, 1891–1892, no. 2, p. 151–157, pl. 10.

Eggs, early growth and young stages described.

1892.1. The growth of the pilchard or sardine. Nature, London, **45**, p. 255–256.

Growth of pilchard.

1892.2. Pilchards. Nature, London, **45**, p. 558.

Growth of pilchard.

1892.3. On the rate of growth of some sea fishes, and the age and size at which they begin to breed. Mar. Biol. Assoc., Journ., n.s., **2**, no. 3, p. 244–256.

Summary of eight French papers on this subject, and observations on age and size of English pilchard.

1892.4. Year-old pilchards. Mar. Bol. Assoc., Journ., n.s., **2**, p. 398.

Note on capture of a few year-old pilchards, April 23, 1892, all but one over 19 cm. long.

1892.5. The reproduction of the pilchard. Brit. Assoc. Adv. Sci., Rept., 6[illegible] meet., p. 686.

Reproduction.

1893. The life history of the pilchard. Mar. Biol. Assoc., Journ., 1893–1895. n.s., **2**, p. 148–153, figs. 1–3.

First successful artificial fertilization; method of incubation described; description of eggs and larvae.

1896. The natural history of the marketable marine fishes of the British Islands London, p. 168–177.

Clupea pilchardus: description; habitat; spawning; eggs and larvae described and figured; growth; maturity.

1912. All about the sardine. Fish Trades Gaz., **29**, no. 1499, Feb. 10, p. 19–20; no. 1500, p. 19–20; no. 1501, p. 19–20.

Description of sardine and other similar fishes; seasons and sizes of sardines in France and England; methods of fishing and preservation in both countries; summary of facts known about spawning; eggs and rate of growth.

Cuvier, *Georges Leopold.*

1829. Le règne animal distribué d'après son organisation, pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée. Paris, 2. ed., **2**, p. 319.

Clupea pilchardus, C. sardina: described; second differs only in being smaller.

Cuvier, *Georges*, and **Valenciennes,** *Achille.*

1831. Histoire naturelle des poissons. Paris, **20**, p. 326–337, pl. 605.

Alausa melanosticta, A. pilchardus: description, distribution of both; anatomy and figure of *A. pilchardus;* classification; fishing methods and gear in Mediterranean.

1848. Notes sur l'histoire naturelle du hareng et de quelques espéces voisines telles que l'alose, la sardine, le white-bait, etc. Arch. Sci. Phys. Nat., **7**, p. 31–32. [*Extracts from* Histoire naturelle des poissons, *by* Cuvier and Valenciennes, vol. 20, 1913.]

Sardine fishing methods of France.

D

Dado, *S. H.*

1931. Statistical report on fresh and canned fishery products. Year 1930. Sardine cannery report, season 1930–31. Calif. Div. Fish Game, Circ., no. 5, 14 pp.

Sardine statistics.

Dahl, *Arthur L.*

1920. From fish to food. How the toothsome sardine is prepared for the market by regular factory methods. Sci. American, **123**, p. 280.

Methods of fishing and canning sardines in California; by-products.

Dantan, *L.*

1905. Notes ichthyologiques. Arch. Zool. Exp., 4. sér., **3**, p. lxi-lxii.

Clupea pilchardus: time and place of spawning in the English Channel.

Darboux, *G.*, **Stephan,** *P.*, **Cotte,** *J.* and **Van Gaver,** *F.*

1906. L'industrie des pêches aux colonies. *In* Exposition coloniale de Marseille, **2**, p. 46-51, 122-130, 145.

Sardine fishery of Tunis and of Algeria; statistics of Algerian fishery.

Davis, *F. M.*

1927. An account of the fishing gear of England and Wales. England Min. Ag. Fish., Fish. Invest., ser. 2, **9**, no. 6, p. 59, 66, 74, 93 (rev. ed.); *ibid* (1. ed.), 1923, ser. 2, **5**, no. 4.

Pilchard fishing methods and gear.

Day, *Francis.*

1879. On the fishes of Weston-super-Mare. Zool. Soc. London, Proc., p. 759–760, pl. lxii.

Clupea pilchardus: description; spawning; figured.

1880. The fishes of Great Britain and Ireland. London, 1880-1884, **2**, p. 224-230.

Clupea pilchardus: synonomy; description; coloration; common names in England; habits; migrations; fishing methods; spawning; methods of preservation; oil; enemies and parasites; distribution.

1882. The digestive organs of the pilchard. Zoologist, 3. ser., **6**, p. 24.

Anatomy of digestive organs of *Clupea pilchardus;* food.

1883. The commercial sea fisheries of Great Britain. Intern. Fish. Exhib. Lit., **8**, p. 286 298.

Clupea pilchardus: description; migrations; methods of fishing and gear; methods of curing; spawning; enemies and parasites; as food; as bait; habitat.

1887. On a supposed hybrid between the pilchard (*Clupea pilchardus*) and the herring (*C. harengus*) and on a specimen of *Salmo purpuratus.* Zool. Soc. London, Proc., p. 129-130, pl. xv.

Description and figure of supposed hybrid.

Delcassé, ------.

1912. Lettre du ministre de la marine à M. le directeur de la marine marchande. *In* Documents concernant la crise sardinière. 1903 à 1912. Réunis par Louis Amieux. Nantes, p. 119–121, 126–128.

Reasons for refusal to suppress the "filets tournants" in sardine fishery.

Delfin, *Federico Teobaldo.*

1901. Catálogo de los peces de Chile. Valparaiso, p. 39.

Clupea sajax: rather full synonomy.

Delgado, *D. Juan.*

1921. Baleares. Bol. Pescas, **6**, no. 61–63, p. 336–339. *Also in* La pesca marítima en España en 1920, Madrid, 1923, **2**, p. 96–99.

Sardine statistics; fishing methods and gear.

Delidon, *E. S.*

1866. La pêche de la sardine. Soc. Linn. Maine-et-Loire, Ann., **8**, p. 79–82.

French sardine fishing methods and gear.

1869. Expérimentation d'un nouvel appat pour la pêche de la sardine (*Clupea pilchardus*). Soc. Linn. Maine-et-Loire, Ann., **11**, p. 177-180.

Experiments with new kind of sardine bait.

Delsman, *H. C.*

1926. Fish eggs and larvae from the Java Sea. Treubia, **8**, liv. 3-4, p. 220-221.

Description of sardine eggs and larvae.

Deno, *R.*

1923. Un nouveau filet pour la pêche de la sardine. Pêch. Marit., **6,** no. 257, p. 270.

"Bolinche," net used in Basque sardine fishery for night fishing.

Denstedt, *O. F.*

1929. Drying properties of pilchard oil. Pacific Biol. Sta., Prog. Rept., no. 4, p. 6-8.

Drying qualities of pilchard oil compared to other oils used in paint.

Deslandes, *A.*

1727. Observations sur les maqueraux et les sardines, poissons trés communs en Bretagne, etc. Acad. Sci. Paris, Mém. [for 1725] p. 2–3.

Mentions that the usually abundant sardines were not seen in 1725 on the coast of Brittany, probably due to the cold winter.

Desmartis, *Télèphe P.*

1854. Divers cas d'empoissonnements occasionnés par des moules, des crevettes, et des sardines. Revue Thérap. Midi, **7,** p. 82–86.

Poisoning from sardines.

Desmartis, *Télèphe P.*, and **Laffargue,** ——.

1851. Deux cas d'empoissonnement occasionné par des sardines (*Clupea sardina*). Journ. Méd. Bordeaux, **9,** p. 286–292. *Also in* Journ. Méd. Chir. Prat., 1851, **22,** p. 363–367; Revue Thérap. Midi, 1851, **2,** p. 225–231.

Description of two cases of poisoning from sardines.

Devedjian, *Karekin.*

1926. Pêche et pêcheries en Turque. Constantinople, p. 52-55, 324-326, 344-345, 16 (supplement at end of volume).

Clupea sardinia: description; spawning season and place; good account of fishing methods and gear; preservation methods; statistics.

Dieuzeide, *R.*, and **Argilas,** *A.*

1928. Essais de conservation temporaire de crustacés et de sardines. Sta. Aquic. Pêch. Castiglione, Bull., fasc. 2, p. 121-125.

Experiments on different methods of canning sardines.

Dill, *D. B.*

1921.1. The utilization of fishery by-products. Fish. Gaz., **38,** no. 4, p. 45–46.

Chemical composition of California sardines and sardine offal of different stages of decomposition (12–108 hours).

1921.2. A chemical study of the California sardine (*Sardinia caerulea*). Journ. Biol. Chem., **48,** no. 1, p. 93-103.

Chemical analysis of sardine, according to size, different schools and different degrees of sexual maturity; gonads analyzed separately.

1921.3. Fat content of the California sardine. Pacific Fish., **19,** no. 8, p. 14.

Difference of fat content of four sizes of fish taken each month during 1919, three months of 1918 and six months of 1920; detailed careful analysis.

1921.4. Kippering sardines for canning. Pacific Fish., **19,** no. 11, p. 12.

Experiment on smoking sardines for canning.

1926. A comparative study of the chemical composition of the sardine (*Sardinia caerula*) from California and British collections. Ecology, p. 221-228.

Chemical composition of sardine; literature cited.

1929. Dietetic importance of the California sardine. Pacific Fish. Stat. No., p. 23-24 (sardine section).

Food value; iodine and calcium content.

Documents Relatifs à la Crise Sardinière, 1903-1907.

See France. Ministère de la Marine. 1908.

ilar, *Robert.*

927. Oriental markets. The buying power of the far east. Outlook, **146,** no. 1, May 4, p. 14–15. *Extract in* Calif. Fish Game, 1927, **13,** no. 3, p. 218–219.

History of growth of sardine market in Orient.

minguez, *Fernando.*

1922. Provincias marítimas de Coruña y Ferrol. Bol. Pescas, **7,** no. 73–75, p. 273–303. *Also in* La pesca marítima en España en 1920. Madrid, 1923, **1,** p. 281–311.

Sardine fishery; statistics.

novan, *Edward.*

1802. The natural history of British fishes . . . London, **3,** pl. 69.

Clupea pilchardus: described; colored plate.

ucloux, *X.*

1901. La pêche en Espagne. État actuel de cette industrie dans les provinces maritimes de Vigo et de Villagarcía. Bull. Mar. March., **3,** January.

Sardine industry.

hamel du Monceau, *Henry Louis.*

1772. Traité général des pêsches, et histoire des poissons. Paris, **2,** sec. 3, p. 420-456, pl. 16, fig. 4.

Migrations; description; fishing methods and gear in Mediterranean and England; sale of fresh sardines in Brittany; methods of preservation (a detailed account); recipes reprinted in Bull. Trim. Pêch. Marit., 1912, no. 3, p. 524–526.

ke, *Robert D.*

924. Commission wins supreme court decision on use of sardines in reduction plants. Calif. Fish Game, **10,** no. 3, p. 123.

Account of case relative to reduction of sardines to fertilizer.

ke of Edinburgh.

883. Notes on the sea fisheries and fishing population of the United Kingdom. Intern. Fish. Exhib. Lit., **4,** p. 40–41, 45–46, 49–50.

Methods of fishing and gear in England.

mont, *Jean-Louis.*

919. L'industrie française de la conserve de sardines. Indus. Franç. Cons., 1919, **5,** no. 30, p. 203-208; 1920, **6,** no. 32, p. 51-56; 1921, **8,** no. 33, p. 36 40; 1921, **8,** no. 34, p. 86 91; 1922, **9,** no. 40, p. 366-371.

Series of articles on French sardine canning industry; habitat; migrations; food values; French fishing methods and gear; sale and distribution of fish as it is brought in; canning methods; by-products; foreign competition (labeling other fish as sardines).

929. La vie errante des sardines. Indus. Franç. Cons., **16,** no. 66, p. 89–91.

Migrations of sardines (from Roule, 1929).

nn, *Matthias.*

886. Some habits of the picked dogs, herrings and pilchards on the coasts of Devon and Cornwall. R. Cornwall Polytech. Soc., **54.** Ann. Rep., p. 155-170.

Habits of pilchards; preyed upon by "picked dogs" or *Spinax.*

888.1. Remarks in connection with the laws, capture, and natural history of the herring and pilchard. R. Cornwall Polytech. Soc., **55.** Ann. Rept. [for 1887] p. 98–117.

Laws governing pilchard fishery of Cornwall; methods of capture; habits of pilchard.

888.2. On a supposed hybrid between the pilchard and the herring. R. Cornwall Polytech. Soc., **55.** Ann. Rept. [for 1887] p. 121–124.

Description of a form intermediate between sardine and herring.

Dunn, *Matthias*—Continued.

1892.1. The migrations and habits of the pilchard. R. Cornwall Polytech. Soc., **60.** Ann. Rept., p. 72–95.

1892.2. Pilchards. Nature, London, **45,** p. 511–512.

Growth and food.

Dunn, *Max S.*

1926. Basic proteins. I. The nitrogen distribution and the percentages of some amino acids in the protamine of the sardine, *Sardina caerulea* Journ. Biol. Chem., **70,** no. 3, p. 697-703.

Chemical study of sardine male gonads.

Dunn, *Max S.*, and **Hollombe,** *B. S.*

1927. The iodine number of a commercial California sardine oil as determined by the Hanus and the Hübl methods. Indus. Eng. Chem., **19,** no. 5, p. 633 637.

Chemistry of sardine oil.

Dyrenforth, *Robert G.*

1887. Patents issued by the United States during the years 1882, 1883, and 1884, relating to fish and the methods, products, and applications of the fish eries. U. S. Comm. Fish., Rept. [for 1885] p. 1080.

Patent on a sardine can; description.

E

Earll, *R. Edward.*

1887.1. The coast of Maine and its fisheries. *In* The fisheries and fishery industries of the United States. Washington, sec. 2, p. 10.

Sardine industry; statistics.

1887.2. The herring fishery and the sardine industry. *In* The fisheries and fishery industries of the United States. Washington, sec. 5, **1,** p. 489-524.

History and development of canning of small fishes (herring, menhaden, mackerel) as sardines; fishing methods and gear; statistics.

Earll, *R. Edward*, and **Smith,** *Hugh McCormick.*

1889. The American sardine industry in 1886. U. S. Fish Comm., Bull. [for 1887] **7,** p. 161.

History of industry; fishing methods and gear; canning methods; international questions (Canada and United States); statistics.

Egypt. Ministry of Finance.

1921+. Report on the fisheries of Egypt. Cairo.

Annual report giving sardine statistics.

Ehrenbaum, *Ernst.*

1909. Eier und Larven von Fischen, andere Eier und Cysten. *In* Nordisches Plankton, Zoologischer Teil, **1,** p. 373–375, 5 figs.

Clupea pilchardus: eggs and larval stages described and figured.

1927. I. Eier und Larven von Fischen. *In* Nordisches Plankton, 10. lief., (pt. 2) p. 373–375.

Clupea pilchardus: bibliography of literature on eggs and larvae; description and figure of egg and four larval stages.

1929. Californische Sardinen. Fischerbote, **21,** heft 19, p. 301–303.

California sardine industry.

Eigenmann, *Carl H.*

1893. The fishes of San Diego, California. U. S. Nat. Mus., Proc. [for 1892] **15,** p. 129, 136, 9 pls.

Clupea sagax: seasonal movements.

gland. Board of Agriculture and Fisheries.

906–1920. Annual report of proceedings under acts relating to sea fisheries. [For 1904 to 1918.] London.

Statistics of the pilchard fishery.

913. First report of the committee appointed by the president of the board of agriculture and fisheries to advise the board on questions relating to the elucidation through scientific research of problems affecting fisheries. London, p. 17.

Recommendations for pursuing pilchard investigation.

gland. Inspectors of Fisheries.

887–1903. Annual report of the inspectors. [First for 1886 to seventeenth for 1902.] London.

Statistics of the pilchard fishery.

gland. Ministry of Agriculture and Fisheries.

Monthly return of sea fisheries. England and Wales. London. [Current.]

Pilchard statistics.

925+. Report on sea fisheries. [For 1919+.] London.

Pilchard statistics.

Sea fisheries statistical tables. London. [Current.]

Annual reports containing pilchard statistics.

ermann, *Barton Warren*, and **Kendall,** *William Converse.*

900. Check-list of the fishes of Florida. U. S. Comm. Fish., Rept. [for 1899] p. 55.

Clupanodon pseudohispanicus listed.

ermann, *Barton Warren*, and **Marsh,** *Millard C.*

902. The fishes of Porto Rico. U. S. Fish Comm., Bull. [for 1900] **20,** p. 84.

Clupanodon pseudohispanicus: description; distribution.

ermann, *Barton Warren*, and **Radcliffe,** *Lewis.*

917. The fishes of the west coast of Peru and the Titicaca basin. U. S. Nat. Mus., Bull., no. 95, p. 20–21.

Sardinella sagax: description; distribution; synonomy.

F

ber, *George Louis.*

883. The fisheries of the Adriatic and the fish thereof. A report of the Austro-Hungarian sea-fisheries, with a detailed description of the marine fauna of the Adriatic gulf. London, p. 63, 85–86, 100, 114, 137–138, 226.

Sardine fisheries, the most important in this region; methods of fishing and gear.

bre-Domergue, *Paul.*

896. Le régime de la sardine. Programme pour le déterminer. Revue Gén. Sci., **7,** no. 9, p. 429–432.

Sardine life habits to be the basis for making laws to protect them; important points discussed: spawning, migrations, food.

908.1. Rapport sur la situation acutelle de l'industrie sardinière présenté à M. le ministre de la marine au nom du comité consultatif des pêches maritimes. *In* Documents relatifs à la crise sardinière. 1903–1907. France Min. Mar., p. 25–32.

Report on conditions of French fishery.

908.2. Rapport . . . sur rogue artificielle de son invention. *In* Documents relatifs à la crise sardinière, 1903–1907. France Min. Mar., p. 95–98.

Process of making artificial "rogue" (roe for bait).

Fabre-Domergue, *Paul*—Continued.

1912. [Letter addressed to Le Matin, 1906, Dec. 26.] *In* Documents concernan la crise sardinière. 1903 à 1912. Réunis par Louis Amieux. Nantes 1. fasc., p. 77–80.

Suggestions for improving French methods of fishing and gear.

1913. Comment on pêche la sardine. Nature, Paris, **41**, no. 2067, p. 65–67. figs. *Extract in* Bull. Trim. Pêch. Marit., 1913, **18**, no. 2, p. 223–229 6 pls.

Methods of fishing in France; very clear illustrations.

Fabre-Domergue, *Paul*, and Biétrix, *Eugène*.

1896.1. Sur les oeufs et les alevins de la sardine dans les eaux de Concarneau Soc. Biol. Paris, C. R., 10. sér., **3**, no. 19, p. 551–552. *Extract by* Marchand *in* Soc. Sci. Nat. Ouest France, Bull., **7**, 1. trim., pt. 2, p. 4–

Eggs and larvae of sardine.

1896.2. Sur l'existence et le développement des oeufs de la sardine dans les eau de Concarneau. Acad. Sci. Paris, C. R.,**122**, p. 1347–1349. *Abstract* Revue Sci., **4**, sér. 5, no. 25, p. 789.

Development of sardine eggs.

1896.3. Sur la reproduction de la sardine océanique. Cong. Intern. Pêch. Mari Sables-d'Olonne, p. 140–144.

Description of eggs, larvae; discussion of reasons and remedies f sardine failure in France.

1897. Recherches biologiques applicables à la pisciculture maritime sur les oeu et les larves des poissons de mer et sur le turbot. Ann. Sci. Nat. (Zool. 8. sér., **4**, p. 173.

Alosa sardina: larva described and figured.

Fage, *Louis*.

1907.1. Essai sur la faune des poissons des îles Baléares et description de que ques espèces nouvelles. Arch. Zool. Exp., 4. sér., **7**, p. 74.

Clupea pilchardus listed.

1907.2. Aperçu sur l'exploitation des fonds maritimes du quartier de Port-Vendr Soc. Aqui. Pêch., Bull., **19**, p. 17–31.

Statistics—1902–1906.

1909. Les procédés de pêche en usage pour la capture de la sardine sur nos côt méditerranéennes. Cong. Pêch. Marit., Sables-d'Olonne, C. R., 1, 188–196.

Relative merits of different methods of fishing in Mediterranean.

1911. Sur une collection de poissons provenant de la côte méditerranéene Maroc. (Note préliminaire.) Soc. Zool. France, Bull., **36**, p. 216.

Clupea pilchardus listed.

1912.1. Sur une collection de poissons provenant de la côte méditerranéene Maroc. Assoc. Franç. Avanc. Sci., C. R. [for 1911] **40**, p. 579. *Also* Soc. Zool. France, Bull., **36**, p. 215.

Clupea pilchardus listed.

1912.2. Recherches sur la croissance de la sardine (*Clupea pilchardus* Walb. Assoc. Franç. Avanc. Sci., C. R., **41**. sess., p. 415–418.

Growth.

1913. Recherches sur la biologie de la sardine (*Clupea pilchardus* Walb.). Premières remarques sur la croissance at l'âge des individus, principa ment en Méditerranée. Arch. Zool. Exp., **52**, fasc. 3, p. 305–341, 22 f

Periods of growth; effect of temperature and reproduction on growt relation between size and age; short bibliography.

1920.1. Rapport sur la sardine. France Off. Sci. Pêch. Marit., Notes, no. 1, 9 p

Racial studies (vertebral counts) on 876 sardines taken from Cadiz Plymouth; growth; differences in fat content at different times a localities; fluctuations in French fishery.

e, *Louis*—Continued.

920.2. Engraulidae. Clupeidae. Danish Oceanogr. Exped., Rept., 2, (Biol.), A9, p. 34–94.

Clupea pilchardus: post-larval stages described and figured; mode of growth; spawning time and place all given for both Atlantic and Mediterranean sardine; fluctuations in both fisheries shown; discussion of four races of sardine; bibliography.

e, *Louis*, and Legendre, *R.*

914. Teneur des sardines en eau et en matières grasses. Soc. Biol. Paris, C. R., 76, p. 284–286.

Fat content in relation to time of year.

es, *E. de*, and Ponzevera, *C.*

908. Les pêches maritimes de la Tunisie. Tunis, 2d ed., p. 68–75, 293, 296, 299, 302.

Sardine fishery of Tunis; fishing methods; statistics.

nsworth, *Philip T.*

930. Sardine exports losing in China. West Coast. Fish., Sept., p. 14–15.

Market for California sardines declining in China.

', *F. J.*

929. "Raw packing" of sardines makes notable savings possible. Pacific Fish., 27, no. 13, p. 21–22.

Description of new method and analytical study of costs.

rari, *H.*

887. L'industrie de la sardine dans la baie de Douarnenez. Revue Sci., 3. sér., 13, p. 520–522.

Economic condition of fishermen; statistics of fishery.

rer y Hernández, *Jaime.*

903. Materiales para la fauna ictiológica de las Baleares. Soc. Española Hist. Nat., Bol., 3, p. 97.

Alosa sardina described.

dler, *R. H.*

930.1. Fishery industries of the United States, 1928. U. S. Comm. Fish., Rept. [for 1929] (Doc. 1067), p. 418, 427, 434, 448, 449.

Sardine statistics of Maine and California.

930.2. Review of the fisheries of California. U. S. B. F., Rept. [for 1930] (Doc. 1087), p. 342–344, 346, 349–352.

Sardine statistics; history of fishery and industry in California.

931. Fishery industries of the United States, 1929. U. S. B. F., Rept. [for 1930] (Doc. 1095), p. 971, 974, 975, 984, 986, 989, 990, 991, 993, 995, 997, 998, 1000, 1001, 1004, 1010, 1011, 1012.

Sardine statistics, California.

n, *D. B.*

931. The nutritive value of marine products. IV. A note on the vitamin A content of commercial pilchard oil. Canada Fish. Branch, Contrib. Canadian Biol., 6, no. 13, p. 355–363, (ser. C, Industrial, no. 1, 9 pp.)

Experiments showing vitamin A potency.

cherbote.

930. Ueber portugiesische Sardinen. Fischerbote, 22, no. 21, p. 368–370. *From* Tidsskrift for Hermetikindustri, Okt.

Sardine industry of Portugal; fishing methods and gear.

931. Die Sardinenfischerei in Frankreich. Fischerbote, 23, heft 15, p. 230–231. *From* Tiddskrift fur Hermetikindustri (date not given).

French sardine fishery; fishing methods and gear.

Fish Trades Gazette.

1912. More about the sardine. Norwegian view concerning the interesting littl fish. Fish Trades Gaz., **30,** no. 1513, May 18, p. 43–44.

Discussion and history of different fish canned as sardines in all coun tries; Norwegian process of packing described; history of litigatio resulting from French interests demanding that only the pilchard be sol as sardine.

1930. British and U. S. sardine industries. Where California has the advantage Fish Trades Gaz., **48,** no. 4460, July 19, p. 27.

Attempt to show why English pilchard industry is not increasing as that of California is; reference to Scofield, W. L. (1930.4).

1931. Portugal's sardine industry. Fish Trades Gaz., **49,** no. 2514, p. 21.

Fishing methods and gear; canning methods.

Fishing Gazette.

1909. Sardines and querille. Fish. Gaz., **26,** no. 41, p. 1281.

Unfavorable conditions in French sardine industry; many small fis (querille) caught with sardines; packers' and solderers' dispute.

1912. What is a sardine? More about the sardine. Fish. Gaz., **29,** no. 2 p. 719; no. 25, p. 771.

English decision in controversy over canning sprats as "sardines."

1917. The French sardine fisheries and the motor boat. Fish. Gaz., **34,** no. 4 p. 1345–1346.

Improvement of fishing methods and gear and handling of fish.

1918. Sardine packing gives new impetus to fishing in California. Fish. Gaz **35,** no. 46, p. 1721–1722.

Development of industry in southern California; methods of canning

1920. French government building standardized sardine boats. Fish. Gaz., 3 no. 8, p. 6–7.

Article from Bulletin Technique, Paris, (date not given); French go ernment to furnish 150 fishing boats to fishermen; description of boats one diagram of fish hold, and one of reverse gear.

1924. Bureau erects plant for sardine canning. Fish. Gaz., **41,** no. 18, p.

Experimental canning factory at Eastport, Maine, for canning fish sardines (small herring).

1925. Cannery to try bureau's process with sardines. Fish. Gaz., **42,** no. 1 p. 45.

"Hot air" method of canning described (Maine).

Fishing News.

1930. A sardine catch. Fish. News, **18,** no. 876, p. 62.

Account of an enormous sardine catch at Monterey, California.

Fiskeri Tidende.

1882. Sardinfisket. Fiskeri Tidende, no. 11, March 14. *Translated from th Danish by* Herman Jacobson *in* U. S. Comm. Fish., Rept. [for 188 1883, p. 163–165.

Sardine fishing methods in France; methods of canning; clear, concis description.

Fiskets Gang.

1930.1. Hvad er "sardiner"? [What is a sardine.] Fisk. Gang, no. 4, p. 50.

Definition of term "sardine."

1930.2. Den amerikanske fiskeproduksjon på Stillehavskysten. Fisk. Gang, n 10, p. 135.

Sardine fishery statistics of California.

Fleming, *John.*

1828. A history of British animals. Edinburgh and London, p. 183.

Clupea pilchardus: description.

ord, *E.*

1930. Some abnormal fishes received at the Plymouth laboratory. Mar. Biol. Assoc., Journ., **17**, no. 1, p. 56, 1 pl.

Pilchard with fantail described and figured.

ouché, A.

1923.1. L'industrie de la sardine doit être réorganisée totalement. Pêch. Marit., **6**, no 289, p. 865–867.

Sardine fishing methods and gear; suggestions for improving conditions in fishery.

1923.2. Comment réorganiser l'industrie de la pêche de la sardine. Pêch. Marit., **6**, no. 290, p. 881–883.

Suggestions for improving conditions of French sardine fishery.

oulon, *Paul.*

1908. Sur une rogue artificielle. Cong. Nat. Pêch. Marit., Bordeaux, C. R., p. 190–195.

Directions for making artificial roe (bait) for sardine fishing.

1909. Rapport sur une expérience de conservation de divers poissons par le froid. Cong. Pêch. Marit., Sables-d'Olonne, C. R., **2**, p. 130.

Experiment on preserving sardines by refrigeration.

owler, *Henry Weed.*

1911. Notes on clupeoid fishes. Acad. Nat. Sci. Philadelphia, Proc., **63**, p. 205, 206.

Records of *Clupanodon neopilchardus* from Australia, *C. pseudohispanicus* from Brazil.

1916. Notes on some fishes from Chile. Copeia, no. 34, p. 64.

Clupanodon sagax recorded from a collection of commercial fishes, Valparaiso.

1928. The fishes of Oceania. Bishop Mus., Mem., **10**, p. 30–31.

Sardinella perforata, S. jussieu, S. melanura, S. sirm: synonomy; description.

ox, *Howard.*

1885. The pilchard fisheries of Falmouth, England, 1882. U. S. Fish Comm., Rept. [for 1883] p. 1183. (*Compiled from* Consular Report for 1882 and 1883.)

Export statistics, 1870–1882.

rance. Chambre des Députés.

1913. Discussion de plusieurs interpellations relatives à la crise sardinière. Bull. Trim. Pêch. Marit., **18**, no. 2, p. 463–618.

Proceedings of the French Chamber of Deputies with regard to the sardine industry.

rance. Commission d'Étude.

1908. Enquête sur la crise sardinière. *In* Documents relatifs à la crise sardinière, 1903–1907. France Min. Mar., annexe no. 2, p. 22–24.

Questionnaire sent out to fishermen to get facts concerning sardine failure.

rance. Ministère de la Marine.

1908. Documents relatifs à la crise sardinière, 1903–1907. Paris, 98 pp.

Collected documents relating to the sardine failure in France, 1903–1907.

rance. Ministère de Travaux Publics.

Statistique des pêches maritimes. Paris. [Current.]

Annual report containing sardine statistics.

rance. Office Scientifique et Technique des Pêches Maritimes.

1924+. Notes, no. 43, 46, 51, 52. Revue Trav., 1928+.

Statistics of French sardine fishery beginning with 1924. [Revue des Travaux is continuation.]

Franco y Salinas, *Felipe.*

1923. La pesca marítima en España en 1920. Costas de las provincias de Cartagena Alicante y Valencia. Bol. Pescas, **8,** no. 81–85, p. 143, 146–165.

Statistics of sardine fishery.

Fries, *Bengt Frederik,* **Ekstrom,** *C. Ulrich,* and **Sundevall,** *C.*

1892. A history of Scandinavian fishes. Second edition revised and completed by F. A. Smitt. Stockholm, **2,** p. 979–983.

See Smitt, F. A., 1892.

Fry, *Donald Hume.*

1931. The ring net, half ring net, or purse lampara in the fisheries of California Calif. Div. Fish Game, Fish Bull., no. 27, 67 pp. *Reviewed in* Pacific Fish., 1931, **29,** no. 4, p. 23–25.

Sardine fishing methods and gear.

Fryer, *Charles Edward.*

1887. The preparation of sprats and other fish as "sardines." Scotland Fish. Bd., 5. Ann. Rept. [for 1886], p. 218–221.

French methods of canning.

Fulton, *T. Wemyss.*

1904. Ichthological notes. Scotland Fish. Bd., 22. Ann. Rept. [for 1903] pt. 3. p. 284.

Clupea pilchardus, rare fish off coast of Scotland.

G

Garau, *V. F.*

1909. Traité de pêche maritime pratique illustré et des industries secondaires en Algérie. Alger, p. 13–39, 20 figs.

Fishing methods and gear for sardines: "sardinal" and "lamparo"; laws regulating both; statistics; methods of salting.

Gebhardt, *F.*

1907. Zwei Fälle von Vergiftung mit Sardinen-Conserven. Pest. Med-Chir. Pres., **43,** p. 653–658.

Two cases of poisoning from canned sardines.

Georgévitch, *Jivoin.*

1926. Sur la *Cocomyza* de la sardine. Arch. Zool. Exp., **65,** p. 57–63, 15 figs. *Reviewed in* Bol. Pescas, 1926, **11,** no. 122, p. 287.

Internal parasite.

Gerville-Réache, *G.*

1888. Rapport général au ministre de la marine et des colonies sur la pêche de la sardine. Revue Marit. Colon., **97,** p. 520–543; *continuation of report by* Berthoule, Renduel, Vaillant and Henneguy, *ibid,* 1888, **98,** p. 33–75. *Also in* Journ. Off., 1887, **19,** no. 274, p. 4455–4456; no. 276, p. 4499–4501; no. 279, p. 4539–4540; no. 283, p. 4599; no. 284, p. 4614–4615; no. 291, p. 4723–4725; no. 292, p. 4739–4742.

Questions regarding regulation of fishery: closed season and kinds of gear; statistics (1872–1887): men; boats; gear; amount and value of catch; imports; exports; Portuguese exports; conditions in French canning factories (number of men, women and children employed, wages); prices of fresh sardines, 1857–1887; prices of canned sardines, 1882–1887.

1908. Rapport de la commission d'enquête sur la crise sardinière présenté à M. le ministre de la marine par le comité consultatif des pêches maritimes. *In* Documents relatifs à la crise sardinière, 1903–1907. France Min. Mar., p. 3–19.

History of the commission of inquiry; summary of replies in answer to questionnaire; nets; recommendations for improving French fishery

ard, *A.*

1888. Sur le *Peroderma cylindricum* Heller, copépode parasite de la sardine. Acad. Sci. Paris, C. R., **107**, p. 929–931.

Description of copepod parasite.

lbert, *Agustí M^a.*

1913. Fauna ictiológica de Catalunya. Catálech raonat dels peixos observats en el litoral y en les aygues dolces catalanes. Inst. Catalana Hist. Nat., Butl., **13**, p. 10.

Alausa pilchardus: synonomy; common names; season; parasites.

fford, *George.*

1883. The disappearance of sardines from the Vendean coast, and its causes. U. S. Comm. Fish., Bull. [for 1882] **2**, p. 13–14.

Attempts to account for phenomenon on basis of deflection of Gulf Stream.

ilbert, *Charles Henry.*

1896. The ichthyological collections of the steamer Albatross during the years 1890 and 1891. U. S. Comm. Fish., Rept. [for 1893] p. 464.

Clupanodon caeruleus listed.

1899. Report on fishes obtained by the steamer Albatross in the vicinity of Santa Catalina Island and Monterey Bay. U. S. Comm. Fish., Rept. [for 1898] p. 25.

Clupanodon caeruleus listed.

ilchrist, *J. F. D.*

1909. Descriptions of fishes from the coast of Natal. S. African Mus., Ann., **6**, pt. 3, p. 269.

Clupea sagax: description.

1913. Review of the South African Clupeidae (herrings) and allied families of fishes. Union S. Africa Mar. Biol. Rept., no. 1, p. 57–59.

Clupea sagax: synonomy; description.

ill, *Theodore Nicholas.*

1862. Synopsis of the subfamily of Clupeinae, with descriptions of new genera. Acad. Nat. Sci. Philadelphia, Proc. [for 1861] p. 33.

Genera *Clupea* and *Meletta* described.

1863. Notice of a collection of the fishes of California presented to the Smithsonian institution by Mr. Samuel Hubbard. Acad. Nat. Sci. Philadelphia, Proc. [for 1862] **14**, p. 281.

Alausa californica: description.

irard, *Charles.*

1854. Descriptions of new fishes, collected by Dr. A. L. Heermann, naturalist attached to the survey of the Pacific railroad route, under Lieut. R. S. Williamson, U. S. A. Acad. Nat. Sci. Philadelphia, Proc., **7**, p. 138, 199.

Meletta caerulea: description; recorded from San Francisco. *Alosa musica:* description; recorded from Chile.

1855. Fishes. *In* U. S. Naval Astronomical Expedition to the Southern Hemisphere during the years 1849–50–51–52. **2**, p. 246, pl. 31.

Alosa musica: described; from Calderon Bay, Chile.

obin, *A.*

1891. La pisciculture en eaux salées. Paris, p. 129–133.

Clupea sardina: description; distribution; food; migrations.

odsil, *Harry C.*

1930.1. Sardine fishing at San Diego. Calif. Fish Game, **16**, no. 3, p. 268.

Use of electric light under water to keep fish from escaping from net.

Godsil, *Harry C.*—Continued.

1930.2. A discussion of the localities in which the California sardine (*Sardina caerulea*) was taken in the San Diego region, 1928–1929. *In* Fishing areas along the California coast for the sardine (*Sardina caerulea*). Calif. Div. Fish Game, Fish Bull., no. 25, p. 40–44.

Certain sizes of fish are found only in certain localities.

1931. The commercial catch of adult California sardines (*Sardina caerulea*) at San Diego. *In* Studies of the length frequencies of the California sardine (*Sardina caerulea*). Calif. Div. Fish Game, Fish Bull., no. 3[illegible] p. 45–55.

Length studies.

Goode, *George Brown.*

1884. Natural history of the useful aquatic animals. *In* The fisheries and fishery industries of the United States. Washington, sec. 1, p. 569.

Clupea sajax (California sardine): distribution.

1903. American fishes. Boston, new ed. revised by Theodore Gill, p. 384–385.

Clupea sajax (California sardine): distribution; habits.

Goode, *George Brown*, and Bean, *Tarleton Hoffman.*

1880. Catalogue of a collection of fishes sent from Pensacola, Florida, and vicinity by Mr. Silas Stearns, with descriptions of six new species. U. S. Nat. Mus., Proc. [for 1879] 2, p. 152–153..

Harengula sardina described.

1883. A list of the species of fishes recorded as occurring in the gulf of Mexico. U. S. Nat. Mus., Proc. [for 1882] 5, p. 239.

Clupea pseudohispanica recorded.

Goodrich, *E. S.*

1922. On a new type of teleostean cartilaginous pectoral girdle found in young clupeids. Linnean Soc. London, Journ., zool., 34, p. 505–509, fig. 5.

Pectoral girdle of *Clupea pilchardus.*

Goto, *G.*

———. American fish industry of the Atlantic coast. Sardine, cod, herring. Kyoto Fisheries Institution.

Text and printed title in Japanese; no date of publication.

Gouault, *M. E.*

1919. Les causes de la crise sardinière et les remèdes que pourrait, à cet égard, offrir l'industrie frigorifique. 6. Cong. Nat. Pêch. Marit., Tunis, C. R., 1 p. 274–285.

Causes and remedy for sardine failure.

Gourret, *Paul.*

1889.1. Statistique de la pêche des poissons taxés de la côte de Marseille. Mus. Hist. Nat. Marseille, Ann., 3, zool. [for 1886–1889] p. 8–21.

Statistics of French sardine fishery.

1889.2. Documents statistique sur la pêche de la sardine dans le golfe de Marseille. Mus. Hist. Nat. Marseille, Ann., 3, zool. [for 1886–1889] p. 61–6[illegible]

Statistics; temperature and currents.

1894.1. Statistique de la pêche des poissons taxés, des thons, des sardines et des langoustes pendant les années 1889 et 1890. Mus. Hist. Nat. Marseille, Ann., 4, zool. [for 1890] p. 18–19.

Sardine statistics.

1894.2. La pêche des issauges à Marseille. Mus. Hist. Nat. Marseille, Ann., 4, zool. [for 1890] p. 48, 49, 51, 52, 53, 55.

Alosa sardina: size at different times of season; statistics of fishery

1894.3. La pêche des mugelières. Mus. Hist. Nat. Marseille, Ann., 4, zool. [for 1890] p. 74.

Alosa sardina: sizes at different seasons.

ourret, *Paul*—Continued.

1894.4. Statistique de la pêche des poissons taxés, des thons, des sardines, des langoustes, des homards et des squinades, en 1891; consommation et commerce du poisson, des coquillages, etc., à Marseille. Mus. Hist. Nat. Marseille, Ann., **4,** zool. [for 1891] p. 50.

Sardine fishery statistics.

1894.5. La pêche des mugelières à Marseille, en 1891. Mus. Hist. Nat. Marseille, Ann., **4,** zool. [for 1891] 3. ann., p. 55–56.

Sardine fishery: statistics of different sizes of fish during year.

1894.6. Statistique de la pêche des poissons taxés, des thons, des sardines, des anchois, des maquereaux, des langoustes, des homards, et des squinades; consommation et commerce du poisson, du coquillage, etc., pendant l'année 1892. Mus. Hist. Nat. Marseille, Ann., **4,** zool. [for 1892] p. 28–29.

Statistics of fishery in France.

1894.7. Les pêcheries et les poissons de la Méditerranée (Provence). Paris, p. 54, 197–207, 357.

Sardine used as bait; fishing methods and gear; good description and a sketch of net; *Alosa sardina:* distribution; names of different kinds of gear used; statistics.

1897. Statistique des poissons pêchés dans le golfe de Marseille en 1893, 1894 et 1895. Mus. Hist. Nat. Marseille, Ann.,**5,** zool. [for 1897] p. 10, 14, 17, 19.

Sardine statistics.

Graeffe, *Eduard.*

1886. Uebersicht der Seethierfauna des Golfes von Triest nebst Notizen über Vorkommen, Lebensweise, Erscheinungs-und Fortpflanzungszeit der einzelnen Arten. Zool. Inst. Univ. Wien, Arb., 1886–1888, **7,** p. 9, 453.

Clupea sardina: time of appearance and spawning.

Graphic.

1880. A sardine fishery in Cornwall. Graphic, London, **22,** p. 67.

Process of canning sardines in Cornwall.

Green, *H. J.*

1883. The herring fisheries. Intern. Fish. Exhib. Lit., **11,** p. 9.

Differences distinguishing pilchard from herring.

Greene, *B. D. Marx.*

1927 1928. An historical review of the legal aspects of the use of food fish for reduction purposes. Calif. Fish Game, 1927, **13,** no. 1, p. 1–17; 1928, **14,** no. 1, p. 42–44.

Account of legal battle over reduction of sardines to fertilizer.

1929. California sardine canners move to standardize their pack. Pacific Fish. Stat. No., sardine section, p. 17–18.

Organizing for betterment of product.

Greene, *Charles Wilson,* and **Greene,** *Carl Hartley.*

1915. The skeletal musculature of the king salmon. U. S. B. F., Bull. [for 1913] p. 27.

Clupanodon caeruleus: superficialis muscles highly developed.

Greffe, *Pierre.*

1930. La fraude des conserves de sardines. Indus. Franç. Cons., **17,** no. 72, p. 120–128.

History of regulations and decisions as to labeling of sardines in Europe.

Griffin, *John L.*

1904.1. Pacific sardines and anchovies. Pacific Fish., **2,** no. 7, p. 21.

Abundance pointing to a lucrative industry.

Griffin, *John L.*—Continued.

1904.2. Those Pacific sardines. Pacific Fish., **2,** no. 8, p. 15.

Discussion of merits of California pack of sardines as compared to Maine herring.

Groupement des Fabricants Français pour l'Étude de la Crise Sardinière.

1905. Rapport (7 décembre, 1905). Nantes, 20 pp.

Résumé of events of 1903, 1904 and 1905; recommendations for helping situation.

Gruvel, *A.*

1913. Les campagnes d'hiver des pêcheurs Bretons sur les côtes de Mauritanie et du Sénégal. Revue Gén. Sci. (date not given). *Extract in* Bull. Trim. Pêch. Marit., **18,** no. 2, p. 274–280.

Recommendation that sardine fishermen of Brittany go to Mediterranean African waters for winter fishing.

1922. En Norvège. L'industrie des pêches. France Off. Sci. Pêch. Marit., Notes, no. 16, p. 62–65. *Translated by* Harry R. Beard, *in* U. S. B. F., Mem Ser., no. 245, 4 pp.

Canning methods for sprat sold as sardines.

1926.1. Les pêches maritimes en Algérie. Paris, p. 49, 76, 83–85.

Clupea pilchardus: important fishery; new factories started; methods and gear.

1926.2. L'industrie des péches sur les côtes tunisiennes. Sta. Océanogr. Salammbô, Bull., no. 4, p. 24.

Clupea pilchardus fishery in Tunis.

Gruvel, *A.*, and **Bouyat,** *A.*

1906. Les pêcheries de la côte occidentale d'Afrique. Paris, p. 157–158.

Clupea senegalensis: three ages of fish erroneously thought three races; season.

Guérin-Ganivet, *J.*

1912. La faune ichthyologique des côtes méridionales de la Bretagne. Lab. Zool. Concarneau, Trav. Sci., **4,** fasc. 6, p. 100.

Clupea pilchardus listed with French common names of sardine.

Guerné, *Jules de.*

1887. La nourriture de la sardine. Nature, Paris, **15, 1.** sem., p. 362–364, 6 figs.

Food of French sardine.

Guéry, *Paul.*

1893. La biologie de la sardine. Revue Marit. Colon., **118,** p. 401–419.

Review of knowledge of sardine migrations and spawning habits; outline of opinions of English and French research workers.

Guichenot, *Adolphe.*

1850. Exploration scientifique de l'Algérie pendant des années 1840, 1841, 1842. Zoologie V. Paris, p. 100.

Alausa pilchardus: short synonomy; description.

Günther, *Albert.*

1868. Catalogue of the fishes in the collection of the British Museum. London, 7. p. 430, 439—440, 442, 443–444.

Clupea pilchardus: synonomy; description. Var. *sardina* and var. *pilchardus* described. *Clupea melanosticta:* synonomy; description. *Clupea pseudohispanica, C. sajax:* synonomy; description.

1880. An introduction to the study of fishes. Edinburgh, p. 660.

Clupea pilchardus, C. sajax: distribution.

Guyader, ———.

1926. L'évolution de la pêche et de l'industrie des conserves de sardines sur le littoral français de l'Atlantique. Pêch. Marit., **9,** no. 399, p. 33–35; no. 400, p. 49–50; no. 403, p. 97–99.

Number of French sardine fishermen; nets; boats; transportation of

uyader, ____—Continued.

fish on land; statistics of canned sardines of France, Portugal and Spain; fishing methods and gear; fluctuations in abundance; recommendations for agreement between fishermen and cannery men.

H

all, *Ansley.*

1898. The herring industry of the Passamaquoddy region, Maine. U. S. Comm. Fish., Rept. [for 1896] (Doc. 360), p. 464–487. *Part about canning quoted in* U. S. B. F., Mem. Ser., no. 8, 3 pp.

Sardine industry: development since beginning in 1875; wages; description of canneries; making of tins; treatment of fish for canning; use of offal; legislation; statistics.

amilton, *Robert.*

1843. British fishes. *In* The naturalist's library. Edinburgh, **2**, p. 167–171.

Clupea pilchardus: distribution; description of methods of fishing off coast of Cornwall; spawning seasons; food.

anson, *H. H.*

1912. The packing of American sardines. Original communications, Eighth International Congress of Applied Chemistry, **18**, p. 131–138. *Also in* Fish. Gaz., 1912, **29**, no. 47, p. 1473–1474.

Fishing methods and gear and methods of canning in Maine.

autot, _____.

1930. La coopérative de sardinerie en Algérie. Sta. Aqui. Pêch. Castiglione, Bull. [for 1929] p. 117–120.

Description of cooperative plan among sardine cannery workers.

awkins, *Samuel M.*

1929.1. Sardine packers strive for perfection. Pacific Fish., **27**, no. 11, p. 19, 24.

New methods of canning introduced at Monterey (methods not described).

1929.2. Purse seiners invade field long held by lampara nets in Monterey fishery. Pacific Fish., **27**, no. 12, p. 38, 42.

Change in sardine fishing gear, Monterey, California.

ayem, *Julien, editor.*

1929. Mémoires et documents pour servir à l'histoire du commerce et de l'industrie en France publiés sous la direction de Julien Hayem. Paris, 12. sér., 368 pp.

Collection of papers and documents relating to the history of commerce and industry in France; papers relating to sardine included in this bibliography under individual authors.

eckel, *Johann Jakob.*

1850. Beiträge zur Kenntniss der fossilen Fische Oesterreichs. Akad. Wiss. Wien, Denkschr., **1**, p. 227–231, pls. 23, 24.

Meletta sardinites: description of fossils from Austria (horizon not given).

efford, *A. E.*

1910. Notes on the teleostean ova and larvae observed at Plymouth in spring and summer, 1909. Mar. Biol. Assoc., Journ., n. s. **9**, p. 44.

Collection of eggs of *Clupea pilchardus;* measurements of eggs.

emming, *Doris.*

1919. The sardine fisheries. Canadian Fish., **6**, p. 394.

Description of slump in economic return of fisheries of Canada, 1919.

endrickson, *Norman.*

1918. Sardine regulations amplified. Pacific Fish., **16**, no. 5, p. 39, 41.

National Canners Association requirements for the packing of California sardines (given in detail).

Hendrickson, *Norman*—Continued.

1919. National canners association inspection system as applied to the southern California sardine industry. Pacific Fish., **17**, no. 1, p. 21–22.

Regulations for packing quoted and explained.

1921. Inspection in the southern California fish canneries. Calif. Fish Game, **7**, no. 4, p. 248–249.

Inspection of sardine factories.

Henneguy, *Louis Félix*.

1891. Histoire naturelle de la sardine. Revue Marit. Colon., **108**, p. 460–468.

Food related to abundance of sardine; spawning.

Hérubel, *Marcel A.*

1912. Pêches maritimes. D'autrefois et d'aujourd'hui. Paris, p. 18–19, 151–153, 157, 164, 270–274, 298, 321–322. *English edition:* Sea fisheries; their treasures and toilers. London, 1912, p. 172–174, 178, 184, 286–290, 312, 334–335.

Temperature of water and migrations of sardine; spawning season; fishery and industry of Spain; industry of Brittany; problems of expensive bait and antiquated fishing methods; statistics of imports and exports.

1919. Documents sur la pêche sardinière. 6. Cong. Nat. Pêch. Marit., Tunis, C. R., **2**, p. 144–171.

Number and kind of boats used in French fishery; statistics of catch brought in at different ports; production of factories; regulations governing fishery; suggestions for improving regulations.

Higgins, *Elmer*.

1920. Progress of the sardine work. Present status of the sardine investigation in the San Pedro district. Calif. Fish Game, **6**, no. 4, p. 180–181.

Sardine investigations in southern California.

1923. Sardines abundant now—but what of the future? Calif. Fish Game, **9**, no. 2, p. 50–51.

Fluctuations in abundance and other factors discussed in relation to sardine supply.

1926. A study of fluctuations in the sardine fishery at San Pedro. Calif. Fish Game Comm., Fish Bull., no. 11, p. 127–158. *Reviewed in* Pacific Fish., 1927, **25**, no. 9, p. 21.

During seasons 1919–1922, data collected on 600 samples, containing 17,500 specimens which were measured, sexed, many weighed and observed for maturity and fatness; statistical studies made from data, and explained; represented in graphs; seasons; fishing areas.

Higgins, *Elmer*, and Holmes, *Harlan B.*

1921. Methods of sardine fishing in southern California. Calif. Fish Game, **7**, no. 4, p. 219–237. *Also in* U. S. B. F., Mem. Ser., no. 81, 10 pp.

Fishing methods and gear described in detail.

Hinard, *Gustave*.

1929. Traitement des déchets de poisson et utilisation des sous-produits. France Off. Sci. Pêch. Marit., Revue Trav., **2**, no. 4, p. 420, 439.

Chemical composition of sardine offal.

Hinard, *Gustave*, and Boury, *M.*

1930. Note sur les conserves de sardines à huile rouge. France Off. Sci. Pêch. Marit., Revue Trav., **3**, no. 1, p. 103–104.

Study of a red stain in certain of French canned sardines due to an organism in alimentary tract of the fish.

Hjort, *Johan*.

1913. Den franske industris kamp mot de norske sardiner. Bemerkninger om ordet sardin av Kristoffer Nyrop. Aarsb. Norges Fisk. [for 1912] heft 4, p. 445–554. *Translated by* Ian Baillie: French sardines and Norwegian sardines. With some remarks on the word "sardine" by Kristoffer Nyrop. Edinburgh, 1913, 116 pp., illus.

Sardine industry of European countries and United States described;

ort, *Johan*—Continued.

scientific names of fishes labeled as sardines; scale readings and growth; migrations along European coast; comparison between *Clupea harengus*, *C. sprattus*, and *C. pilchardus*, with regard to life history and quality as food; prices; confusion concerning popular name; oil; machinery and trade-marks used; vindication of the name "Norwegian sardines"; derivation of word and different usages.

ek, *Paul Peronius Cato.*

912. Het sardine-proces voor den londenschen rechter. Med. Vissch., **19**, p. 60–63.

Litigation: English vs. Norwegians concerning labeling sprats as sardines.

914.1. Les clupéides (le hareng excepté) et leurs migrations. Cons. Explor. Mer, P. V., **18**, p. 1–69.

Review of work on migrations; racial differences between Atlantic and Mediterranean forms; statistics of fishery in England, France and Portugal; conclusions based on study of statistics.

914.2. Catalogue des poissons du nord de l'Europe, avec les noms vulgaires dont on se sert dans les langues de cette région. Cons. Explor. Mer, Publ. Circ., no. **12**, p. 57.

Clupea pilchardus: common names in the languages of Europe; distribution.

lder, *Charles Frederick.*

912. The fishes of the Pacific coast. New York, p. 99.

Clupanodon caeruleus: bait for game fish; said to spawn in Avalon Bay, Santa Catalina Island.

ldsworth, *Edmund William Hunt.*

874. Deep-sea fishing and fishing boats. An account of the practical working of the various fisheries around the British Islands, with descriptions of the boats, nets, and other gear in use. London, p. 111, 130–132, 157–158, 187–196.

Spawning of pilchards; migrations; seasons for fishing along English coast; fishing methods and gear; methods of curing; statistics of yearly return of "sean-fishery," 1815–1873.

877. Sea fisheries. *In* British industries, *edited by* G. Phillips Bevan. London, p. 88–93.

Methods and gear of the Cornish pilchard fishery.

883. Apparatus for fishing. Intern. Fish. Exhib. Lit., **1**, p. 32–44.

Pilchard fishing methods and gear.

lt, *Ernest W. L.*

897. Observations et recherches sur les oeufs flottants de téléostéens faites dans le golfe de Marseille, à la station zoologique d'Endoume, durant l'année 1895. Mus. Hist. Nat. Marseille, Ann., **5**, zool. [for 1897] p. 26, 27, 28, 30, 31.

Results of collections and study of relative abundance of *Clupea pilchardus* eggs.

899. Recherches sur la reproduction des poissons osseux, principalement dans le golfe de Marseille. Mus. Hist. Nat. Marseille, Ann., **5**, zool., no. 2, p. 97–98.

Clupea pilchardus: literature on reproduction and eggs; description of egg and larva.

lt, *Ernest W. L.*, and Scott, *S. D.*

897. A record of the teleostean eggs and larvae observed at Plymouth in 1897. Mar. Biol. Assoc., Journ., n. s., **5**, p. 165, 169.

Records of eggs of *Clupea pilchardus*.

rnell, *James.*

910. Report on the results of a fishing cruise along the Malabar coast and to the Laccadive Islands in 1908. Madras Fish. Bull., **4**, no. 2, p. 91–126.

Indian sardine: migrations; spawning; food. *Clupea longiceps*, *C. lile*, *C. fimbriata*, all mentioned; apparent inverse correlation between sardine and mackerel abundance; unusual mortality among sardines; statistics.

Hornell, *James*, and Nayudu, *M. R.*

1924. A contribution to the life-history of the Indian sardine with notes on the plankton of the Malabar coast. Madras Fish. Bull., **17**, no. 5, p. 129–197; 10 pls. (Report no. 5 of 1923.)

Well-rounded fishery investigation on *Sardinella longiceps* but over only short period; plankton investigation; abundance of mackerel inversely related to abundance of *Sardinella*. Conclusions: no races; mature at one year; length 15 cm.; go offshore to spawn; young migrate inshore at 4.5–7.5 cm.; high mortality after spawning; growth only 1 cm. in second year; come inshore to feed on phyto-plankton; season of abundance and rapid growth September to December; slow growth January to April; scales show rings; fatness dependent on oil secreting organisms in plankton; abundance of these organisms dependent on nitrogen in water and bright sunshine; internal parasites.

Houghton, *Milton T.*

1930. Markets for canned goods in Chile are good. West Coast Fish., June, p. 12–13.

Sardine market in Chile; statisitcs of importations of sardines into Chile from United States and Spain (1927, 1928 and 1929).

Houghton, *W.*

1883. The natural history of commercial sea fishes of Great Britain and Ireland. Intern. Fish. Exhib. Lit., **10**, p. 382–394.

Clupea pilchardus: description; migrations; spawning; food (list of diatoms); fishing methods and gear; statistics of amount and value of catch in Cornwall; curing methods; derivation of word pilchard.

Hubbs, *Carl Leavitt.*

1917. A note on the food of *Squalus sucklii*, the California dogfish. Copeia no. 43, p. 38.

Sardinella caerulea: food of the dogfish.

1925. Racial and seasonal variation in the Pacific herring, California sardine and California anchovy. Calif. Fish Game Comm., Fish Bull., no. 8, p. 11–12. *Reviewed in* Pêch. Marit., 1927, **10**, no. 455, p. 100.

Sardinia caerulea: racial studies based on number of vertebrae.

1929. The generic relationships and nomenclature of the California sardine. Calif. Acad. Sci., Proc., 4. ser., **18**, no. 11, p. 261–265.

Generic relationships; *Sardinops* given as correct generic name for California sardine.

1930. A check-list of the marine fishes of Oregon and Washington. Pan-Pacific Res. Instn., Journ., **3**, no. 3, p. 11.

Sardinia caerulea listed.

Huhlein, *Fred E.*

1931. Portugal's sardine industry. Fish. Gaz., **48**, no. 4, p. 22–23.

Fishing methods and gear; low wages of employees; machinery and supplies used; statistics of exports for 1929 and 1930.

Hutton, *Frederick Wollaston.*

1890. List of the New Zealand fishes. New Zealand Inst., Trans. [for 1889] 22 p. 284.

Clupea sagax recorded.

1904. Index faunae Novae Zealandiae. London, p. 51.

Clupea sagax recorded.

Hutton, *Frederick Wollaston*, and Hector, *James.*

1872. Fishes of New Zealand. Catalogue with diagnoses of the species; with notes on the edible fishes by James Hector. Colonial Museum and Geological Survey Department. Wellington, p. 63, 119–120, pl. XI, fig. 100.

Clupea sajax: description; distribution; abundance; figured.

I

land. *Inspectors of Irish Fisheries.*

872+. Report [for 1871]. [Current.]

Statistics of pilchard fishery in many of the numbers.

J

cobson, *Herman, translator.*

883. The sardine fisheries. U. S. Comm. Fish., Rept. [for 1880] p. 163–165. *From* Sardinfisket, *in* Fiskeri Tidende, 1882, no. 11, March 14.

Sardine fishing methods and gear in France; methods of preservation; canning.

cquème, *C.*

926. Les poissons et les animaux marins du golfe du Lion. Leur pêche et leur nature. Marseille, p. 444–447, 450–453.

Spawning; food; development; growth; fishing methods and gear.

pan. Department of Finance.

915. 15. Financial and economic annual of Japan. p. 54.

Amounts of raw and manufactured sardine products for each year from 1904 to 1913.

pan. Imperial Fisheries Bureau.

904. World's fair, St. Louis, 1904. Japan. Special catalogue. Fishing industry. Descriptive catalogue. Tokyo, p. 16, 17; Dept. M, group 122, p. 1.

Statistics; spawning season; distribution.

pan. Section of Statistics. Department of Agriculture and Forestry.

922+. The agricultural and commercial statistics.

Statistics of sardine fishery. Current.

kins, *J. Travis.*

902. Altersbestimmung durch Otolithen bei den Clupeiden. Wissen. Meeresunter., Abt. Kiel, n. f., **6**, p. 117–119.

Clupea pilchardus: studies on otoliths in relation to age.

nyns, *afterwards Blomefield, (Rev.) Leonard.*

842. Fish. *In* Zoology of the voyage of H. M. S. "Beagle," during the years 1832–1836; edited by Charles Darwin, pt. 4, p. 134–135.

Clupea sajax: description; fauna of Peru.

s, *Stoddard.*

918. Sardine fishermen's price named. Pacific Fish., **16**, no. 1, p. 25, 27.

U. S. Food Administrator's regulations in regard to sardine industry.

nson, *A. B.*

925. Senate bill no. 250 by Senator A. B. Johnson. Calif. Fish Game, **11**, no. 3, p. 116.

Bill adopted by California legislature regulating the amount of sardines that can be used in reduction plants.

nston, *George.*

838. A list of the fishes of Berwickshire, exclusive of the salmones. Berwickshire Nat. Club., Proc., **1**, p. 173.

Clupea pilchardus listed as rare.

nston, *Robert M.*

883. General and critical observations on the fishes of Tasmania, etc. R. Soc. Tasmania, Pap. [for 1882] p. 133.

Clupea sagax: description.

Johnston, *Robert M.*—Continued.

1890. Further observations upon the fishes and fishing industries of Tasmania, together with a revised list of indigenous species. R. Soc. Tasmania, Pap. [for 1890] p. 37.

Clupea sagax recorded.

Johnstone, *James.*

1911. Internal parasites and diseased conditions of fishes. Lancashire Sea-fish. Lab., Rept. [for 1910] (no. 19), p. 37–39, 1 fig. *Also in* Liverpool Biol. Soc., Trans., 1911, p. 109–111.

Hard fibroma (tumour) in a pilchard.

1919. The dietetic values of sprats and other clupeoid fishes. Liverpool Biol. Soc. Trans., **33,** p. 110–111, 126. *Also in* Lancashire Sea-fish. Lab., Rept. [for 1918] 1919, (no. 27), p. 40–41, 56.

Clupanodon pilchardus, Sardinia caerulus: food value of different kinds of canned product; chemical analysis.

1925. Malignant tumours in fishes. Lancashire Sea-fish. Lab., Rept. [for 1924] (no. 33), p. 105–106, 2 figs. *Also in* Liverpool Biol. Soc., Trans., 1925, **39,** p. 169–170.

Hard fibroma (tumour) in a pilchard.

Jordan, *David Starr.*

1885.1. Notes on a collection of fishes from Pensacola, Florida, obtained by Silas Stearns, with descriptions of two new species (*Exocoetus volador* and *Gnathypops mystacinus*). U. S. Nat. Mus., Proc. [for 1884] **7,** p. 33, 39.

Clupea pseudohispanica: food of snappers.

1885.2. List of fishes collected at Key West, Florida, with notes and descriptions. U. S. Nat. Mus., Proc. [for 1884] **7,** p. 106–107.

Clupea sardina: description.

1887.1. List of fishes collected at Havana, Cuba, in December, 1883, with notes and descriptions. U. S. Nat. Mus., Proc. [for 1886] **9,** p. 33.

Clupea pseudohispanicus and *C. sardina* listed.

1887.2. A preliminary list of the fishes of the West Indies. U. S. Nat. Mus., Proc. [for 1886] **9,** p. 561.

Clupea pseudohispanica, C. sardina listed.

1887.3. A catalogue of the fishes known to inhabit the waters of North America north of the Tropic of Cancer, with notes on the species discovered in 1883 and 1884. U. S. Comm. Fish., Rept. [for 1885] p. 824.

Clupea sajax, C. pseudohispanica, C. sardina listed; the last described and color and synonomy given.

1887.4. The fisheries of the Pacific coast. *In* The fisheries and fishery industries of the United States. Washington, sec. 2, p. 595.

Statistics of sardine fishery in San Diego County (herring and sardine 900 pounds in 1879).

1905. A guide to the study of fishes. New York, **2,** p. 50–51.

Sardinella pilchardus mentioned as sardine of Europe; *S. pseudohispanica* of Cuba; *S. caerulea* of California; *S. sajax* of Chile; *S. melanosticta* of Japan.

1917. Changes in names of American fishes. Copeia, no. 49, p. 85.

Sardina pilchardus, S. caerulea: synonomy; nomenclature of genus.

1918. Note on silversides and sardines. Copeia, no. 56, p. 45–46.

Sardina should be *Sardinia.*

1919. The genera of fishes. Stanford Univ. Publ., Univ. Ser., pt. 3, p. 297, 1920, pt. 4, p. 512.

Sardina and *Sardinia* listed with authorities.

1923. A classification of fishes including families and genera as far as known. Stanford Univ. Publ., Univ. Ser., Biol. Sci., **3,** no. 2, p. 121.

Sardina and *Sardinia* listed.

dan, *David Starr*—Continued.

925. Fishes. New York, p. 276.

Sardinia pilchardus mentioned as sardine of Europe; *S. pseudohispanica* of Cuba; *S. caerulea* of California; *S. sajax* of Chile; *S. melanosicta* of Japan.

dan, *David Starr*, and **Evermann**, *Barton Warren.*

896.1. The fishes of north and middle America. U. S. Nat. Mus., Bull., no. 47, pt. 1, p. 423–424.

Clupanodon caeruleus, C. pseudohispanicus: description; distribution; synonomy of each.

896.2. A check-list of the fishes and fish-like vertebrates of north and middle America. U. S. Comm. Fish., Rept. [for 1895] p. 281.

Clupea caeruleus, C. pseudohispanicus: listed; distribution.

908. American food and game fishes. New York, p. 99–101.

Clupanodon caeruleus, C. pseudohispanicus: distribution and description of both; color of *C. caeruleus.*

dan, *David Starr;* **Evermann**, *Barton Warren;* and **Clark**, *Howard Walton.*

930. Check list of the fishes and fish-like vertabrates of north and middle America north of the northern boundary of Venezuela and Colombia. U. S. Comm. Fish., Rept. [for 1928] pt. 2, (Doc. 1055), p. 43.

Sardinia caerulea: distribution.

dan, *David Starr*, and **Gilbert**, *Charles Henry.*

881.1. Notes on a collection of fishes from San Diego, California. U. S. Nat. Mus., Proc. [for 1880] **3**, p. 30.

Clupea sagax: color; recorded from San Diego.

881.2. List of the fishes of the Pacific coast of the United States with a table showing the distribution of the species. U. S. Nat. Mus., Proc. [for 1880] **3**, p. 457. *Also in* Smithson. Misc. Coll., 1882, **22**, art. 1.

Clupea sajax recorded.

882.1. Synopsis of the fishes of North America. U. S. Nat. Mus., Bull., no. 16, p. 265–266.

Clupea sajax: description; distribution; synonomy.

882.2. Notes on the fishes of the Pacific coast of the United States. U. S. Nat. Mus., Proc. [for 1881] **4**, p. 37.

Clupea sagax: distribution in California.

883.1. Notes on fishes observed about Pensacola, Florida, and Galveston, Texas, with description of new species. U. S. Nat. Mus., Proc. [for 1882] **5**, p. 247–248.

Clupea pseudohispanica: description.

883.2. On certain neglected names of La Cépède. U. S. Nat. Mus., Proc. [for 1882] **5**, p. 574.

Clupanodon to be substituted for *Clupeonia* and would include *C. pilchardus.*

dan, *David Starr*, and **Herre**, *Albert Christian.*

907. A review of the herring-like fishes of Japan. U. S. Nat. Mus., Proc., **31**, p. 632–633.

Description and coloration of *Sardinella melanosticta* with record stations.

dan, *David Starr*, and **Hubbs**, *Carl Leavitt.*

925. Record of fishes obtained by David Starr Jordan in Japan, 1922. Carnegie Mus., Mem., **10**, no. 2, p. 121.

Sardinia melanosticta: Japanese common names; markets where seen.

dan, *David Starr*, and **Jouy**, *Pierre Louis.*

882. Checklist of duplicates of fishes from the Pacific coast of North America, distributed by the Smithsonian Institution in behalf of the United States National Museum, 1881. U. S. Nat. Mus., Proc. [for 1881] **4**, p. 15.

Clupea sajax records in California.

Jordan, *David Starr,* and **Richardson,** *Robert Earl.*

1909. A catalogue of the fishes of the island of Formosa, or Taiwan, based on th collections of Dr. Hans Sauter. Carnegie Mus., Mem., **4,** no. 4, p. 166.

Sardinella toli listed; "sardines and pilchards should stand as *Ambly gaster* Bleeker, a name earlier than *Sardinia* Poey."

Jordan, *David Starr,* and **Seale,** *Alvin.*

1906. The fishes of Samoa. U. S. B. F., Bull. [for 1905] **25,** p. 186.

Sardinella sirm: coloration.

Jordan, *David Starr,* and **Snyder,** *John Otterbein.*

1901. A list of fishes collected in Japan by Keinosuke Otaki, and by the Unit States steamer *Albatross,* with descriptions of fourteen new species. U. Nat. Mus., Proc., **23,** p. 349.

Clupanodon melanostictus recorded from Tokyo.

Jordan, *David Starr,* and **Starks,** *Edwin Chapin.*

1895. The fishes of Puget Sound. Calif. Acad. Sci., Proc., ser. 2, **5,** p. 790. *Al in* Stanford Univ., Contrib. Biol. Hopkins Lab., 1895, no. 3, p. 790.

Clupanodon caeruleus abundant in warmer part of season.

Jordan, *David Starr,* **Starks,** *Edwin Chapin,* **Culver,** *George Bliss,* and **William** *Thomas Marion.*

1895. The fishes of Sinaloa. Calif. Acad. Sci., Proc., ser. 2, **5,** p. 408.

Sardinella stolifera quite abundant at Mazatlan, Mexico.

Joubin, *Louis.*

1888.1. [Note sur les ravages causés chez les sardines par un crustacé parasite Acad. Sci. Paris, C. R., **107,** p. 842–844.

Parasitic crustacean destructive to sardines.

1888.2. Sur un copépode parasite des sardines. Acad. Sci. Paris, C. R., 1 p. 1177–1178.

Parasites.

1913. Notes sur la biologie de la sardine. Bull. Trim. Pêch. Marit., **18,** no. p. 216–222.

Alosa sardina: migrations; spawning; illustrations of egg, larvae stages) and adult; growth.

1919. Rapport sur quelques expériences de frigorification de la sardine. 6. Cor Nat. Pêch. Marit., Tunis, **1,** p. 237–250.

Experiments on refrigeration of sardines.

Joubin, *Louis,* and **Le Danois,** *Edouard.*

1924. Catalogue illustré des animaux marins comestibles des côtes de France des mers limitrophes avec leurs noms communs français et étrange France Off. Sci. Pêch. Marit., Mém. (Sér. Spéc.), no. 1, p. 13.

Clupea pilchardus: figured; short description; long list of comm names, European and North African.

1928. Catalogue illustré des animaux marins comestibles des côtes de France des mers limitrophes avec leurs noms communs français et étrange France Off. Sci. Pêch. Marit., Mém. (Sér. Spéc.), no. 8, p. 7.

Clupea pilchardus: common names of southern Europe.

K

Kamiya, *Takayuki.*

1925. The pelagic eggs and larvae of fishes on the coast of "Hokuriku" (Nor western part of Japan proper). Japan Imp. Fish Inst., Journ., no. 3, p. 30.

Sardinella melanosticta: description of egg; spawning season; ti of day spawning occurs—sunset to sunrise.

Kemp, *N. H., et al.*

1885. The sardine canning industry of Eastport, Maine. (A petition to the s retary of the treasury.) U. S. Fish Comm., Bull. [for 1885] **5,** 241–243.

ıp, *N. H., et al.*—Continued.

Appeal to do away with duty on "sardines" (small herring) brought in from Canadian waters for canning.

dall, *William Converse.*

08. Fauna of New England. 8. List of the fishes. Boston Soc. Nat. Hist., Occ. Pap., **7**, no. 8, p. 37.

Clupanodon pseudohispanica: synonomy; distribution.

dall, *William Converse*, and Smith, *Hugh McCormick.*

95. Extension of the recorded range of certain marine and fresh-water fishes of the Atlantic coast of the United States. U. S. Fish Comm., Bull. [for 1894] **14**, p. 17–18.

Clupea pseudohispanica: description; distribution.

gorlay, *Y. de.*

929. La cuisson des sardines destinées à la conserve. Pêch. Marit., **12**, no. 597, p. 691. *From* La Conserverie Française, 1929.

Cooking methods for French sardine canning.

zoncuf, *J.*

916. La pesca en Francia en el año 1912. Bol. Pescas, **1**, no. 1–2, p. 9–12.

Sardine fishery of France; statistics.

917. La pêche maritime. Son évolution en France et à l'étranger. Paris, p. 269–296.

Importance of sardine industry in France; fishing methods and gear; industrial problems; a certain kind of bait detrimental to fish; statistics of French fishery; graph showing amounts and value, 1895–1913; controversy over use of name "sardine" in other countries for other kinds of fish; refrigeration.

hinouye, *Kamakichi.*

907. Notes on the natural history of the sardine (*Clupea melanosticta* Schlegel). [Text in English.] Japan Imp. Fish. Bur., Journ., **14**, no. 3, p. 71–105, pls. 13–21.

Distribution; migrations; habits; food; spawning season; description of gonads at different stages of spawning; description of eggs and vertical distribution; description of early development from egg, larva to post-larval fish; rate of growth; sexual differences; fat content (not a chemical study); enemies; habits with regard to mode of capture; descriptions and figures of five other clupeids of Japan; cranial structure of each species described and figured.

ınzinger, *Carl Benjamin.*

880. Die von Müller'sche Sammlung australischer Fische in Stuttgart. Akad. Wiss. Wien, Sitzber. [for 1879] **80**, 1. abt., p. 416.

Clupea neopilchardus recorded.

ımberger-Gorjanovic, *Drag.*

883. Die Jungtertiäre Fischfauna Croatiens. Beitr. Paläont. Oesterreich-Ungarns, **3**, p. 76.

Clupea sardinites: described, fossils from early tertiary of Croatia.

sch, *Anton.*

900. Die Fischerei im adriatischen Meere. Wien and Pola, p. 54, 270–273.

Sardine season in Adriatic; amounts canned; methods of canning on eastern coast of Adriatic.

ýyer, *Henrik Nicolaj.*

838. Danmarks Fiske. Kjøbenhavn, 1838–1853, **3**, p. 175–176.

Clupea pilchardus: description; synonomy; distribution.

nstler, *J.*

903. La question sardinière et la crise aquicole en général. Soc. Sci. Arcachon, trav., **7**, p. 33–86. *Also separate*, 1904, 54 pp.

Discussion of reasons for sardine failure and suggestions for study of situation; food and migrations of sardine; fishing methods and gear.

Kyle, *Harry M.*

1928. Die Statistik der Seefischerei Nordeuropas. *In* Handbuch der Seefischere Nordeuropas, **10,** heft 4, tab. A, L, N.

Sardine statistics of England and France.

1929. Die Seefischerei von Grossbritannien und Irland. *In* Handbuch der Se fischerei Nordeuropas, **6,** heft 1–3, p. 112; heft 4, p. 265–267, 3 figs

Description of Cornwall pilchard net and of pilchard fishery of Cornwal

Kyle, *Harry M.*, and **Ehrenbaum,** *Ernst.*

1929. Teleostei Physostomi. Clupeiformes. *In* Die Tierwelt der Nord- und Ostse Die Fische der Nord- und Ostsee. Leipzig, XII, c 90; XII f 12, 18.

Clupea pilchardus: short description; figured; distribution; given in key for planktonic eggs of the North Sea.

L

Lacépède, *Bernard Germain Étienne.*

1829. Histoire naturelle des poissons. Tome VII. *In* Oeuvres du Comte d Lacépède, Paris, **11,** p. 131–133.

Clupea sardina: common names of different countries; distributio description.

Landrieu, *Gustave.*

1904. La question de la rogue. Assoc. Franç. Avanc. Sci., C. R., 32. sess. [f 1903] pt. 2, p. 799–810.

"Rogue" (cod roe) used as bait for sardines; history of use of bait sardine fishery, and present day methods; artificial "rogue" described.

Lang, *O. W.*

1929. How California sardines are prepared for canning. Pacific Fish. Stat. N sardine section, p. 11–15.

Canning methods.

Lang, *O. W.*, and **Dean,** *S. J.*

1928.1. Exhaust and vacuum in one-pound oval sardine cans. Pacific Fish., 2 no. 11, p. 20–21, 23.

Technical analysis of conditions to assure satisfactory vacuum.

1928.2. Waterproof coatings for sardine tanks. Univ. Calif., Hooper Foundatio Progress Report, June, 1928. Mimeographed manuscript; 3 illus.

Improvements in coatings for receiving and brining tanks.

Langton, *H. M.*

1923. Pilchard oil. Soc. Chem. Ind., Journ., **42,** no. 6, p. 47–48.

Detailed chemical analysis.

Larousse Universel en deux volumes.

1923. Sardine. Paris, **2,** p. 885, 886.

Set of illustrations representing the whole French industry from bo and nets to nailing up the boxes of cans; description of fish; distributio short paragraph on the industry.

Launette, *P.*

1876. Considérations sur la pêche de la sardine. Lorient, 16 pp.

Questions concerning disappearance of sardine; suggestions for solut of problem.

1882. Observations sur la pêche de la sardine. Ann. Sci. Nat. (Zool.), 6. s **13,** art. 10, 14 pp.

Discussion of fishery in France.

1887. Sur la pêche de la sardine. Acad. Sci. Paris, C. R., **104,** p. 373–375.

Sardine fishery in France.

1888. Recherches sur les lieux de frayères et le mode de ponte de la sardin Mémoire à monsieur le ministre de la marine et de colonies. Lorie 12 pp.

aunette, *P.*—Continued.

Enormous abundance in 1888; effect of currents and eddies on sardine spawning; oily condition of sea seems to be attractive to sardines and this simulated by the "rogue" used by fishermen.

each, *T. A.*, and Golding, *N. S.*

1931. The economics of pilchard oil. Canadian Fish., **18,** no. 8, p. 31.

Substitution of pilchard oil for butter fat in calf feeding found to cause death in 15 days.

e Bail, -------.

1908. La crise sardinière. Cong. Nat. Pêch. Marit., Bordeaux, p. 453–471.

Recommendations for improving bad conditions in French sardine fishery.

1909. L'industrie des conserves de sardines. Bull. Trim. Pêch. Marit., **14,** no. 2, p. 593–616.

History of canning in Europe; experiments to improve pack.

e Bail, *G.*

1912. . . . M. Le Bail, député, déclare que les filets tournants ne doivent être tolérés ni pour les sardines, ni pour les maquereaux. *In* Documents concernant la crise sardinière. 1903 à 1912. Réunis par Louis Amieux. Nantes, p. 101. *Taken from* Le Citoyen, Quimper, 1912, March 13.

Arguments against use of "filets tournants" for capturing sardines.

eboucq, *Charles.*

1927. Le marché de la sardine doit être étendu par l'emploi du froid. Pêch. Marit., **10,** no. 482, p. 530.

Recommendation of refrigeration to help enlarge sardine market.

ebour, *Marie V.*

1919. The food of post-larval fish. No. II (1918). Mar. Biol. Assoc., Journ., n.s. **12,** p. 36.

Food of 13 specimens of *Clupea pilchardus.*

1920. The food of young fish. No. III (1919). Mar. Biol. Assoc., Journ., n.s. **12,** p. 276–277.

Clupea pilchardus: food of 271 specimens.

1921.1. The larval and post-larval stages of the pilchard, sprat and herring from Plymouth district. Mar. Biol. Assoc., Journ., n.s. **12,** p. 433–439.

Eggs; larvae; description of growth and development; migration of dorsal fin.

1921.2. The food of young clupeoids. Mar. Biol. Assoc., Journ., n.s. **12,** p. 465–467.

Food of *Sardina pilchardus.*

1927. The food of *Sardina pilchardus* (Walbaum). Soc. Sci. Nat. Maroc. Bull., **7,** no. 7–8, p. 220–223.

Food of Moroccan sardine.

e Bour, *R.*

1909. La pêche de lar sardine en Bretagne. Cong. Pêch. Marit., Sables-d'Olonne, C. R., **1,** p. 168–188.

Sardine fishery in Brittany: history; bait, "rogue"; methods of manufacturing artificial "rogue"; economic and social conditions of fishermen.

e Danois, *Edouard.*

1913. Contribution à l'étude systématique et biologique des poissons de la Manche occidentale. Inst. Océanogr. Monaco, Ann., **5,** no. 5, p. 40. *Also separate,* Thèses présentées à la faculté des sciences de Paris pour obtenir le grade de docteur ès sciences naturelles. Paris, 1913, p. 40.

Clupea pilchardus: synonomy; English and French common names; description; distribution.

Le Danois, *Edouard*—Continued.

1921. Les poissons comestibles de la Manche et de l'Atlantique français. Leur description. Leur pêche. Leur reproduction. *In* Bibliothèque du "Journal de la Marine Marchande." Paris, p. 6–7.

Clupea pilchardus: French common names; description; distribution; French fishery.

1929. Les races locales de la sardine des côtes françaises (Manche et Atlantique). Cons. Explor. Mer. P. V., **54**, p. 35–41. *Reviewed in* Pêch. Marit., 1929, **12**, no. 585, p. 502–503; *and in* Biol. Abst., 1931, **5**, no. 3, item 9934.

Sardine races of the English Channel and the Atlantic; growth curves.

1930. Rapport sur le fonctionnement de l'office des pêches maritimes pendant l'année 1929. France Off. Sci. Pêch. Marit., Revue Trav., **3**, no. 1, p. 12–14. *Résumé in* Pêch. Marit., 1930, **13**, no. 635, p. 549.

Review of work of Office on races of sardine; "wild" sardine (out of season fishery); sexual dimorphism.

Le Danois, *Edouard*, and Belloc, *G.*

____. Liste des poissons recueillis au cours de la croissière de la Tanche, en 1924, sur les côtes de Tunisie. France Off. Sci. Pêch. Marit., Mém. (Sér. Spéc.), (no date), no. 3, app. 1, p. 51.

Clupea pilchardus listed from one station.

Le Gall, *Jean.*

1928.1. Notes et observations sur la biologie de la sardine de la Manche. Cons. Explor. Mer, Journ., **3**, no. 2, p. 206–223.

Clupea pilchardus: state of sexual maturity; age and growth; proportional measurements; spawning season and areas; migrations; bibliography.

1928.2. Contribution à l'étude de la sardine des côtes françaises de la Manche et de l'Atlantique. France Off. Sci. Pêch. Marit., Revue Trav., **1**, no. 2, p. 11–26. *Reviewed in* Pêch. Marit., 1928, **11**, no. 546, p. 723–724.

Racial studies on sardines of Audierne, pilchards of Plymouth, and celans of Boulogne; length, sex and maturity; age and growth; measurements of different parts of body; review of knowledge of spawning, larvae and young; bibliography.

1930.1. Contribution à l'étude de la sardine des côtes françaises de la Manche et de l'Atlantique. Deuxième partie. France Off. Sci. Pêch. Marit., Revue Trav., **3**, fasc. 1, p. 19–46.

Clupea pilchardus: on coast of Brittany; racial studies based on body proportions, number of vertebrae, and measurements; sexual maturity; intestinal fat; age and growth studied by scale readings; methods of fishing and gear; length and age; migratory cycle; spawning; temperature affecting migrations.

1930.2. L'état actuel de la notion de "races" chez la sardine. Cons. Explor. Mer. P. V., **68**, p. 105–115.

Racial studies on European sardine; vertebral counts; length; weight; sexual maturity; fat content.

1931. Les principales pêches maritimes de la France: les filets et engins qui sont employés. Pêch. Marit., **14**, no. 666, p. 188–190.

Sardine fishing methods and gear in France.

Le Goffic, *Charles.*

1912. La crise sardinière. *In* Documents concernant la crise sardinière. 1908–1912. Réunis par Louis Amieux. Nantes, p. 13–24. *Taken from* Rev. des Deux-Mondes, 1907, Jan. 15.

Study of economic conditions in France with recommendations for relieving wretched conditions.

Lemon, *William.*

1785. Report from the committee appointed to enquire into the state of the pilchard fisheries, and consider of the most effectual means of securing and improving the same. *In* Reports to the house of commons. London, 1785–1801, **10**, B, p. 1–8.

Condition of fishery; statistics.

my, *Pierre.*

1901. Les conserves hermétiques de poissons en France et à l'étranger. Cong. Intern. Aqui. Pêch., Paris, Mem., p. 353–358.

Methods of canning sardines in France; statistics of production.

1909. L'industrie et la contrefaçon des conserves de sardines. Ann. Fals., 2, no. 8, p. 264–266.

Protest against labeling canned fish as "sardines," which are really other kinds, a practice carried on by the United States and Norway principally.

1912. Rapport présenté en 1907 . . . au comité d'entente et de patronage pour l'amélioration du sort des marins-pêcheurs, sur la situation de l'industrie sardinière et l'étude des moyens proposés pour l'améliorer. *In* Documents concernant la crise sardinière. 1903 à 1912. Réunis par Louis Amieux. Nantes, 1. fasc., p. 169–173.

Suggestions for improving state of sardine fishermen and of fishery.

1919.1. La lutte des fabricants français de conserves de sardines contre la fraude. 6. Cong. Nat. Pêch. Marit., Tunis, C. R., 1, p. 200–201.

Opposition of the French sardine factories against other countries labeling sprats, herring, etc., as sardines.

1919.2. Pêche de la sardine en 1919. Revue Franç. Cons. Aliment., 3, no. 28, p. 647.

Condition of French sardine fishery.

1926. Le syndicat des fabricant de conserves de sardines proteste contre le reproche de malthusianisme. Pêch. Marit., 9, no. 447, p. 802.

In defense of French sardine canneries: their methods are for the good of the industry.

emy, *Pierre,* and Montariol, _____.

1918. L'industrie des conserves de poissons en Californie. Revue Franç. Cons. Aliment., 2, no. 17, p. 377–384.

California sardine fishing methods and canning procedure; regulations governing canning.

engerich, *Hanns.*

1922. Die Fabrikation von spanischen Sardinen. Die Herstellung von Sardinen und Salzheringen in Indien (Java). *In* Der Fisch, herausgegeben von Dr. Hanns Lengerich. Lübeck, 2, p. 182–186.

Canning methods of Spain and Java.

ewis, *R. C.*

1929. The food habits of the California sardine in relation to the seasonal distribution of microplankton. Scripps Instn. Oceanogr., Bull., Tech. Ser., 2, no. 3, p. 155–180. (*See* Parr, 1930, for criticism of this paper.)

Sardinia caerulea: food and feeding habits; literature cited.

lbaudière, *F.*

1909. Les origines de l'industrie des conserves de sardines. Soc. Acad. Nantes, Ann., 10, 8. sér., p. 196–245. *Also separate,* Nantes, 1910, 67 pp.

History of sardine canning in Nantes.

lljeborg, *W.*

1881. Sveriges och Norges fiskar. Upsala, 1881–1883, 3, p. 106–112.

Clupea pilchardus: synonomy; description; food.

ndner, *Milton J.*

1929. Albino sardine. Calif. Fish Game, 15, no. 2, p. 176.

Description of albino sardine taken at Monterey, California, Sept. 18, 1928.

1930.1. Luminescent fishing. Calif. Fish Game, 16, no. 3, p. 237–240.

Sardine fishing methods and gear at Monterey, California.

Lindner, *Milton J.*—Continued.

1930.2. Fishing localities at Monterey from November, 1919, to March, 1929, for the California sardine (*Sardina caerulea*). *In* Fishing areas along the California coast for the sardine (*Sardina caerulea*). Calif. Div. Fish Game, Fish Bull., no. 25, p. 8–27.

Fishery shows signs of decline since boats have to go farther than formerly; statistics; maps and graphs.

1931. Sardines. *In* The commercial fish catch of California for the year 1929 Calif. Div. Fish Game, Fish Bull., no. 30, p. 30–33.

Importance and history of sardine industry; comparison of catch of seven foreign countries with that of California.

Linton, *Edward.*

1901. Parasites of fishes of the Woods Hole region. U. S. Fish Comm., Bull. [for 1899] **19**, p. 415, 423, 424, 438.

Clupanodon pseudohispanicus: parasites.

Lleó, *José María.*

1923. Costas de Cataluña. Bol. Pescas, **8**, no. 81–85, p. 179, 186, 216–227. *Also in* La pesca marítima en España en 1920. Madrid, 1923, **1**, p. 103, 110, 140–151.

Statistics of sardine fishery.

Lo Bianco, *Salvatore.*

1888. Notizie biologiche riguardanti specialmente il periodo di maturità sessuale degli animali del golfo di Napoli. Zool. Sta. Neapel, Mitt., **13**, p. 555.

Clupea pilchardus: season of sexual maturity in gulf of Naples.

Lockington, *W. N.*

1880. The herring of the Pacific coast. American Nat., **14**, p. 518–519.

Clupea sajax: description.

1881. Report upon the edible fishes of the Pacific coast, U. S. A. Calif. Comm. Fish., 6. Rept. [for 1880] p. 21, 57.

Clupea sajax: compared with herring; abundance; distribution.

Logan, *George.*

1863. Further notice of the herring and sprat fishery of the Firth of Forth. R. Phys. Soc. Edinburgh, Proc. [for 1859–1862] **2**, p. 289.

Clupea pilchardus: record of considerable quantities taken; observations on sexual maturity and size.

Loir, *A.*

1894. Note sur plusiers cas d'empoisonnement produits par des sardines rouges. Soc. Biol. Paris, C. R., 10. sér., **1**, p. 141–143.

Poisoning from canned sardines.

Lombardo, *Antonino Calabro.*

1884. La morfologia della colonna vertebrale dei Clupeidi. Nat. Siciliano, 3, p. 336–339, pls. 4, 5.

Clupea sardina: morphology of the vertebral column.

Lord, *Clive.*

1927. A list of the fishes of Tasmania. Pan-Pacific Res. Instn., Journ., **2**, no. 4, p. 12.

Sardinia neopilchardus recorded.

Lowe, *James ("The Chronicler").*

1864. A ramble in Finisterre; with notes on oyster-culture, marine fish-hatching, sardine fishing, etc., as practiced on the shores of the bay of Biscay. Field, London, **23**, p. 76, 92.

Description of French sardine industry (catching and curing).

owe, *Richard Thomas.*

1837. A synopsis of the fishes of Madeira; with the principal synonoms, Portuguese names, and characters of the new genera and species. Zool. Soc. London, Trans., **2**, p. 189.

Clupea sardina: description; Portuguese common names.

owrie, *W. L.*

1920. Statistics, fishing industry of Portugal, 1914–1918. U. S. B. F., Mem. Ser., no. 146.

Statistics of sardine fishery of Portugal.

ozano y Rey, *Luis.*

1919. Los peces de la fauna ibérica en la colección del museo en 1 de Enero 1919. Mus. Nac. Cien. Nat., Trab., ser. zool., no. 39, p. 29.

Clupea pilchardus listed with localities.

1921. Datos para la ictiología marina de Melilla. Soc. Española Hist. Nat., Mem., **12**, no. 2, p. 157.

Clupea pilchardus listed with lengths of specimens measured.

übbert, *H.*

1914. Was ist eine Sardine? Fischerbote, **6**, no. 4, no. 6, p. 159–171, 265. *Also in* Der Fisch, herausgegeben von Dr. Hanns Lengerich. Lübeck, 1924, **2**.

Kinds of fish canned as sardines.

1931. Umfang und Methoden der französischen Seefischerei. Fischerbote, **23**, heft 13, p. 194.

Sardine fishery in France; French fishing methods and gear.

ucas, A. H. S.

1890. A systematic census of indigenous fish, hitherto recorded from Victorian waters. R. Soc. Victoria, Proc., ser. 2, art. 2, p. 37.

Clupea sagax recorded.

yons, *Frederick B.*

1930. Greece buys more sardines. West Coast Fish., July, p. 22; Aug., p. 14.

Sardine importations into Greece of ten countries, including the United States; statistics.

M

M., *P. de.*

1903. Les migrations de la sardine et la crise sardinière. Nature, Paris, 2. sér., **10**, p. 138.

Migrations of sardines and reasons for their disappearance.

M'Coy, *Frederick.*

1867. On the recent zoology and paleontology of Victoria. Ann. Mag. Nat. Hist., ser. 3, **20**, p. 188. *Also in* Intercolonial Exhibition, Melbourne [for 1866–67] 1867, Essays, no. 7, p. 13.

Clupea melanosticta: first noticed in 1864 in Hobson's Bay, Australia; enormous abundance in 1866; synonomy.

McCulloch, *Allan R.*

1911. Zoological results of the fishing experiments carried out by the F. I. S. "Endeavour" 1909–1910. *In his* Report on the fishes obtained by the F. I. S. "Endeavour" on the coasts of New South Wales, Victoria, South Australia and Tasmania. Sydney, **1**, pt. 1, p. 17.

Clupea neopilchardus: recorded; distribution.

1919. Studies in Australian fishes. Australian Mus., Rec., **12**, p. 172–175, pl. XXVI.

Sardinia neopilchardus: rather complete synonomy; description; coloration; distribution; reproduction; common names in Australia; seasonal appearance.

McCulloch, *Allan R.*—Continued.

1922. Check list of the fishes and fish-like animals of New South Wales. R. Zool. Soc. New S. Wales, Australian Zoological Handbook, no. 1, p. 17.

Sardinia neopilchardus, Australian pilchard: synonomy; habits.

McFarland, *Raymond.*

1911. A history of the New England fisheries. New York, p. 210–215, 248–252.

History of canning small herring as sardines; methods of canning.

Machado, *Antonio.*

1857. Catálogo de los peces que habitan ó frequentan las costas de Cadiz y Huelva, con inclusión de los río Guadalquivir. Sevilla, p. 11.

Clupea sardina listed from coast of Cadiz.

McKay, *Colin.*

1922. French sardine pack for 1921. Canadian Fish., **9,** no. 2, p. 30.

Unsatisfactory season accounted for by poor means of distribution of product.

McIntosh, *William Carmichael,* and **Masterman,** *Arthur Thomas.*

1897. The life-histories of the British marine food-fishes. London, p. 422–428, pl. 19, fig. 1.

Clupea pilchardus: spawning seasons; review of discoveries in connection with spawning; habits; growth; larva figured.

Macleay, *William.*

1880. On the Clupeidae of Australia. Linnean Soc. New S. Wales, Proc. [for 1879] **4,** p. 371–373.

Clupea sagax: description; migrations.

1882. Descriptive catalogue of the fishes of Australia. Linnean Soc. New S. Wales, Proc., **6,** p. 258.

Clupea sajax listed.

Mader, *C.*

1909. Recherches sur la sardine du golfe de Gascogne. Sta. Biol. Arcachon, Bull., **2,** fasc. 2, p. 125–276.

History of fishery in Gulf of Gascony; fishing methods and gear; fishing seasons; discussion of races; nature of ocean bottom, depth, temperature, density, winds; other meteorological conditions; reproduction; conservation; migrations; improvements for boats and fishing gear; economic conditions of fishermen and conditions of industry.

Madurec, *Yves.*

1912. La mer ne meurt pas, mais on la laisse mourir. Nantes, 7 pp.

Suggestion that sardines have not left the French coast but fishermen should get new methods.

Maljean, *Joseph Léon.*

1894. Analyses de sardines. Journ. Pharm., sér 5, **29,** p. 450–452.

Chemical analysis of sardine.

Malm, *August Wilhelm.*

1877. Göteborgs och Bohusläns fauna. ryggradsdjuren. Göteborg, p. 117, 585–587.

Clupea pilchardus: description; distribution.

Manning, *John Ruel.*

1930. Fish meal in animal feeding with bibliography. U. S. B. F., Rept. [for 1930] (Doc. 1090), p. 397.

Iodine content of sardine fish meal.

Marchand, *J. B. Émile.*

1926. La pêche au Maroc. Paris, p. 49–51.

Sardine migrations.

archis, *M. E.*

1930. Un centre de pêche Breton. Douarnenez-Tréboul. Soc. Océanogr. France, Bull., **10,** no. 53, p. 969–970, 973.

Condition of sardine fishery in Brittany.

arion, *Antoine Fortuné.*

1888. La sardine sur les côtes de Marseille. Acad. Sci. Paris, C. R., **106,** p. 1461–1463.

Statistics by months for 1887; food; size; spawning.

1889.1. Observations sur la sardine de la Méditerranée. Acad. Sci. Paris, C. R., **109,** p. 290–292.

Spawning; synopsis of knowledge of life history.

1889.2. Recherches sur la sardine de la Méditerranée. Mus. Nat. Hist. Marseille, Ann., **3,** Zool. [for 1886–1889] p. 69–83.

Food; migrations; spawning; larvae; young.

1891.1. Nouvelles observations sur la sardine de Marseille. Acad. Sci. Paris, C. R., **112,** p. 641–643.

Spawning.

1891.2. Reproduction et croissance de la sardine dans le golfe de Marseille durant la campagne 1891. Assoc. Franç. Avanc. Sci., C. R., 20. sess., pt. 1, p. 238–239.

Spawning and growth.

1894.1. La sardine sur les côtes de Marseille, durant la campagne 1889–1890. Mus. Hist. Nat. Marseille, Ann., **4,** Zool. [for 1890] p. 99–108, pl. 1, figs. 4–7.

Sardine: statistics of fishery; sizes at different times of year; migrations; spawning; description of eggs; figures of egg and three stages after hatching; growth.

1894.2. Remarques générales sur le régime de la faune pélagique du golfe de Marseille, particulièrement durant l'année 1890. Mus. Hist. Nat. Marseille, Ann., **4,** Zool. [for 1890] p. 124–130.

Succession of pelagic forms that furnish food to fishes, among them sardines.

1894.3. La sardine sur les côtes de Marseille, durant la campagne 1890–1891. Mus. Hist. Nat. Marseille, Ann., **4,** Zool. [for 1891] p. 67–72.

Eggs and larvae: time for appearance.

1894.4. Observations climateriques faites à la station zoologique d'Endoume pour servir à l'étude du régime des pêches régionales. Mus. Hist. Nat. Marseille, Ann., **4,** Zool. [for 1892] p. 1–20.

Observations on sardine fishery for the year 1892.

Martinet, *Ludovic.*

1887. La pêche au beuf, à la sardine et à l'anchois dans le Roussillon. Revue Sci., 3. sér., **13,** p. 658–661.

Sardine fishery; fishing methods and gear.

Matthews, *J. Duncan.*

1887. On the structure of the herring and other clupeoids. Pt. I. The skeleton. Scotland Fish. Board, 5. Ann. Rept. [for 1886] p. 289–291.

Detailed description of skeleton of *Clupea pilchardus.*

Mazarelli, *G.*

1910. Larve e forme giovanili di Teleostei dello stretto di Messina. Riv. Mens. Pesca, **12,** no. 10–12, p. 323.

Clupea pilchardus: numerous young of 25–35 mm. collected in Straits of Messina.

Meek, *Alexander.*

1916. The migrations of fish. London, p. 94–101.

Clupea pilchardus: distribution; spawning; egg described and figured; development and growth; growth related to scale readings; scale figured;

Meek, *Alexander*—Continued.

migrations described and given in map. *Clupea pseudohispanica* from Mexico, *C. caerulea* of California, *C. sagax* of Pacific and Indian oceans, *C. neopilchardus* of Australia and New Zealand, mentioned with localities

Meek, *Seth E.*, and Hildebrand, *Samuel F.*

1923. The marine fishes of Panama. Field Mus. Nat. Hist., Publ., no. 115 (Zool. Ser. 15), p. 183–184.

Sardinella sardina: synonomy; description; color; distribution.

Metz, *Charles William.*

1912. The fishes of Laguna Beach, California. Laguna Mar. Lab., 1. Ann. Rept. [for 1911] p. 30.

Sardinella caeruleus records; occasionally found in tide-pools.

Metzelaar, *J.*

1919. Report on the fishes collected by Dr. J. Boeke in the Dutch West Indies. 1904–1905. With comparative notes on marine fishes of tropical West Africa. p. 203.

Sardina pilchardus synonomy.

Miranda y Rivera, *Alvaro de.*

1921. Notas de estadística de pesca en la costa Andaluza. Bol. Pescas, 6, no. 56-58, p. 122–125, 2 graphs.

Statistics of Spanish sardine fishery.

1923. Costas mediterráneas S. y Marruecos español. Bol. Pescas, 8, no. 77–80, p. 79–81, 85. *Also in* La pesca marítima en España en 1920. Madrid, 1923, 1, p. 4–6, 9.

Condition of sardine fishery; statistics; "sardinal," a sardine net, described; season for fishing.

1930. Investigaciones metodicas realizadas en 1928 en el laboratorio de Malaga Nota I. Biología aplicada. Spain Inst. Español Oceanogr., Not. Res., ser. 2, no. 37, p. 2–4.

Sardina pilchardus: sexual maturity at different seasons.

Mitchell, *W. Stephen.*

1883. On the place of fish in a hard-working diet with notes on the use of fish in former times. Intern. Fish. Exhib. Lit., 1, p. 34, 98.

Sardine: chemical analysis; history of use.

Monconduit, *P.*

1927. Situation de la pêche maritime en Tunisie au 1er janvier, 1927. Sta. Océanogr. Salammbô, Bull., no. 6, p. 7, 24, 30, 32, 34, 36, 47, 50.

Statistics of sardine fishery of Tunis.

Moniteur de la Pisciculture.

1887. [Sardine fisheries in France.] *Translated in* U. S. B. F., Bull. [for 1886] 6, p. 408–409. Moniteur de la Pisciculture, Paris, 2, sér. c, no. 24.

French fishing methods and gear; methods of canning.

Montalban, *Heraclio R.*

1930. Investigations on fish preservation at Estancia, Panay, Philippine Islands. Philippine Journ. Sci., 42, no. 2, p. 310–314, 316–321, 322–327.

Sardinella longiceps: preservation methods; runs of sardines at Estancia during 1927.

Monticelli, *F. S.*

1887. Note elmintologiche: sul nutrimento e sui parasiti della *Sardina clupea pilchardus*, C. V. del golfo di Napoli. Soc. Nat. Napoli, Boll., 1, p. 85–88.

Food and parasites of sardine.

Moreau, *Émile.*

1881. Histoire naturelle des poissons de la France. Paris, 3, p. 458–460.

Alosa sardina: synonomy; common names of Europe; description; habitat; distribution; parasite of eye.

reau, *René.*

1924. M. Léon Meyer, revenant sur les promesses fait à la chambre, interdit l'exportation des sardines et harengs frais, salés et fumés. Pêch. Marit., 7, no. 334, p. 493–494.

Exportation of sardines from France forbidden.

1927. L'inévitable et long conflit sardinier. Pêch. Marit., 10, no. 474, p. 401–402.

Conflict with regard to French sardine fishery; general discussion of decline of franc and prices.

ori, *Tamezo.*

1928. A catalogue of the fishes of Korea. Pan-Pacific Res. Instn., Journ., 3, no. 3, p. 3.

Sardinella melanosticta, S. immaculata, S. zunashi listed with Korean common names, and locality.

üller, *Carl.*

1909. Der Fang und die Verarbeitung der Sardinen. Himmel und Erde, 21, p. 546–553.

Methods of fishing in France; economic conditions of fishermen.

urie, *James.*

1903. Report on the sea fisheries and fishing industries of the Thames estuary. Kent and Essex Sea Fisheries Committee, London, p. 103.

Condition of pilchard fishery.

urphy, *Robert Cushman.*

1923. Fisheries resources in Peru. Sci. Mon., 16, p. 600.

Sardinella sagax: habits; fishery, Pisco Bay, Peru.

N

ature.

1912. Sardines. Nature, London, 89, p. 194.

A legal decision concerning selling sprats labeled as sardines; Quibbon, 1912, quoted on use of term "sardine" in Europe.

atvig, *Jacob B.*

1921. Norwegian view of salmon competition. Pacific Fish., 19, no. 5, p. 44. (This title should read "sardine" instead of "salmon.")

Protest against article in Pacific Fish., 1921, 19, no. 2, p. 54; labeling sprats as sardines.

avarro, *Francisco de P.*

1926. Estudios sobre los clupeidos de Baleares. 1. Estados jóvenes de la sardina (*Clupea pilchardus* Walb.). Spain Inst. Español Oceanogr., Not. Res., ser. 2, no. 9, 25 pp., 16 text figs. (Résumé in French.) *Reviewed in* Biol. Abst., 1929, 3, no. 9–11, item 22767; *and in* Bol. Pescas, 1926, 11, no. 117, p. 137–138.

Spawning areas; study of age and growth of young sardines by scale readings; study of gill rakers as racial character; food; literature cited.

elson, *E. M.*, and Manning, *John Ruel.*

1930. Vitamins A and D in fish oils. Ind. Eng. Chem., 22, no. 12, p. 1361–1363.

Sardine oil found to be poorer in vitamin A than codliver, but equal in vitamin D.

Neuparth, *A. E.*

1923. Consideraçoes sobre a abundancia e escassez de sardinha nas costas sul de Portugal e de Espanha. A Pesca Maritima, Julho.

Fluctuations in abundance.

icholson, *F. A.*

1921. Remarks on canning. Madras Fish. Bull., 18, p. 110–111, (report no. 2).

Canning of sardines.

Nicolas, ------.

1913. Congrès extraordinaire de la federation syndicale des pêcheurs et sardiniers de France tenu à Nantes les 25 et 26 janvier 1913. Bull. Trim. Pêch. Marit., **18**, no. 2, p. 423–436.

Proceedings of a meeting of the above-mentioned parties concerning French sardine industry.

Nilsson, *Sven.*

1855. Skandinavisk fauna. Lund, **4**, p. 522–527.

Clupea pilchardus: description; methods of catch in England and Scandinavia.

Ninni, *Emilio.*

1923. Primo contributo allo studio dei pesci e della pesca nelle acque dell'impero Ottomano. Miss. Italiana Explor. Levante, **5**, p. 16, 29, 69, 147, 159, 173, 177, 180, 182, 184, 186.

Clupea pilchardus: fishing methods in Turkey; methods of preservation; regulations for fishery; statistics.

Nobre, *Augusto.*

1895.1. La sardine sur la côte de Porto durant la campagne de 1894-1895. Ann. Sci. Nat. Oporto, **2**, p. 107–113.

Possible relation of gear to decline in fishery; destruction of young sardines; statistics.

1895.2. A pesca do savel (*Alosa vulgaris*) e da sardinha (*Alosa pilchardus*) na bahia do Douro. Ann. Sci. Nat. Oporto, **2**, p. 179.

Condition of Portuguese fishery.

Noël de la Morinière, *Simon Barthélemy Joseph.*

1815. Histoire générale des pêches anciennes et modernes, dans les mers et les fleuves des deux continens. Paris, p. 88, 338–339.

Sardine fishery in Mediterranean in middle ages.

Norsk Fiskeritidende.

1912. Sardinsagen. Norsk FiskTid., **31**, no. 4, p. 172–176.

Norwegian side to the sardine-sprat controversy.

1913. Den franske industris kamp mod de norske sardiner. Norsk FiskTid., **32**, no. 1, p. 1–6.

Controversy over labeling sprats as sardines; review of Hjort, 1913.

1915. Sardinsagen. Norsk FiskTid., **34**, no. 8, p. 258–264.

Litigation over labeling sprats as sardines.

Nyrop, *Kristoffer.*

1913. Bemerkninger om ordet sardin. Aarsb. Norges Fisk. [for 1912] heft 4, p. 554–560.

Usage of the word sardine in different countries of Europe.

O

Obst, *Maud Mason.*

1919. A bacteriologic study of sardines. Journ. Infect. Dis., **24**, p. 158–169, 3 text figs.

Bacteriological study of canned sardines (east coast of U. S.).

Odin, *Amédée.*

1891. Essais de pêche de la sardine au large des côtes de Bretagne. Revue Sci. Nat. Ouest, **1**, p. 364.

(Apparently a review of a paper by Chabot-Karlen with the title as above but no date given.) Availability of sardine in commercial quantities in open ocean.

1894. Recherches documentaires sur les pêches maritimes françaises. Histoire de la pêche de la sardine en Vendée et sur les côtes les plus voisines (1610–1880). Revue Sci. Nat. Ouest, **4**, p. 137–184; *ibid.* (continuation of

lin, *Amédée*—Continued.

article), 1895, **5**, p. 65–92, 157–214, illus. *Also* separate, Paris, 1895, 134 pp., illus. *Review by* G. R. *in* Soc. Aquic. Pêch. Bull., 1895, **2**, pt. 2, p. 122–124.

History of French sardine fishery; laws; development of fishery; statistics; methods and gear; history of canning; supposed causes of disappearance of sardine; measures for protection.

1896. Les besoins de l'industrie de la sardine. Cong. Pêch. Marit., Sables-d'Olonne, C. R., p. 127–135.

Needs of the French sardine industry.

1908. Note sur les différentes rogues. Cong. Nat. Pêch. Marit., Bordeaux, p. 195–202.

Different kinds of artificial bait for sardines.

euvre.

1913. La crise sardinière. L'Oeuvre, Paris, suppl. to no. 1, Jan. 2.

Conditions of famine in Brittany as result of sardine crisis.

gilby, *J. Douglas.*

1893. Edible fishes and crustaceans of New South Wales. Sydney, p. 180, pl. xlv.

Clupea sajax: synonomy; description; coloration; season for appearance.

1916. Check list of the cephalochordates, selachians, and fishes of Queensland. Queensland Mus., Mem., **5**, p. 98.

Amblygaster neopilchardus: synonomy; distribution.

ku, *K.*

1904. Chemical composition of sardine (*Clupea melanosticta*). [Text in English.] Japan Imp. Fish. Bur., Journ., **13**, no. 1, p. 1–19.

Sex ratio (more females than males); maturity of ovary; length and weight of fish; chemical composition of bones, viscera, flesh, all fresh; chemical composition of salted sardine, sardine scrap, dried guano, and sardine scale.

sorio, *Balthazar.*

1895. Secundo appendice ao "Catalogo dos peixes de Portugal" de Felix Capello. Acad. Sci. Lisboa, Jorn., 2. ser., **3**, p. 256, 266.

Clupea pilchardus recorded.

uizille, *Georges.*

1912.1. Rapport. *In* Documents concernant la crise sardinière. 1903 à 1912. Réunis par Louis Amieux. 1. fasc., p. 157–161.

Extracts from report presented to Chamber of Commerce of Lorient, Feb. 17, 1903, on sardine fishery.

1912.2. Contribution à l'étude de la crise sardinière. *In* Documents concernant la crise sardinière. 1903–1912. Réunis par Louis Amieux. 1. fasc., p. 173–182.

History of sardine industry in France; statistics.

uizille, *Hubert.*

1926.1. Les alternatives de marasme et de prospérité de l'industrie sardinière avant la guerre. Pêch. Marit., **9**, no. 429, p. 513–515. *Also separate*, Paris, 1926.

Development of canning factories in Brittany, their prosperity and reverses; laws.

1926.2. L'industrie sardinière subit une crise de quantité et de prix. Pêch. Marit., **9**, no. 430, p. 529–530. *Also separate*, Paris, 1926.

History of French sardine industry; statistics.

1926.3. La redoutable concurrence de la sardine portugaise. Pêch. Marit., **9**, no. 432, p. 561–562. *Also separate*, Paris, 1926.

History of competition of Portuguese sardines in market; statistics.

Ouizille, *Hubert*—Continued.

1926.4. État actuel des principaux marchés extérieurs pour la sardine françaiso Pêch. Marit., **9**, no. 433, p. 577–578; no. 434, p. 595.

Foreign markets for French sardine; duties imposed and amoun exported.

P

Pacific Fisherman.

1903. Pacific coast sardine. Pacific Fish., **1**, no. 9, p. 9.

Suitability of sardine for canning; reopening of a cannery at Po Townsend, Washington.

1904.1. Sardines, herring and smelts. Pacific Fish., **2**, no. 4, p. 15.

English methods of canning sardines.

1904.2. Dry salted sardines. Pacific Fish., **2**, no. 9, p. 10.

Experiments (not described) being made at Monterey, California.

1905. Sardine canning in the west. Pacific Fish., **3**, no. 11, p. 7.

Good description of canning methods at this period, in southern Cal fornia.

1912.1. Laws about fish and sardine labels. Pacific Fish., **10**, no. 5, p. 17.

Laws of United States (not given in detail).

1912.2. Sardine defined. French canners win sardine case. Pacific Fish., 1 no. 6, p. 25; no. 9, p. 26.

Notes on English court decision in sardine labeling controversy.

1915+. Sardines. Pacific Fish., 1915+.

A section in each issue during sardine season, taking up fishing an market conditions.

1916.1. Illegal to call Norwegian brisling sardines in England. Pacific Fish., 1 no. 5, p. 26–27.

Account of European controversy over labeling brisling as sardines decision of English court.

1916.2. Use of term sardine. Pacific Fish., **14**, no. 11, p. 17.

Note on an order of Department of Trade and Customs of Australi July 13, 1916, that "sardine" applies only to immature pilchard and to n other fish.

1917.1. Van Camp sardine process. Pacific Fish., **15**, no. 3, p. 20.

Sardine canning process, southern California.

1917.2. Manufacture of fish meal in southern California. Pacific Fish., **15**, no. p. 23.

Growth of this industry; use of surplus fish for fertilizer.

1917.3. Success in the turn of a can. Pacific Fish., **15**, no. 6, p. 26.

Beginning of use of tall round tin for sardines. (*See* Wheeler, H. 1917.)

1917.4. Inspection for California sardine packers. Pacific Fish., **15**, no. 11, p. 1

Southern California sardine packers cooperate with National Canne Association for uniform inspection of canned fish.

1917.5. Government license regulations. Pacific Fish., **15**, no. 11, p. 40.

Rules of U. S. Food Administration for canning sardines.

1918.1. An improved can-opener system. Pacific Fish., **16**, no. 3, p. 46.

Improved sardine tin described and illustrated.

1918.2. New trade marks approved. Pacific Fish., **16**, no. 4, p. 43.

List of canned sardine trade marks (Maine and California).

1918.3. Sardine regulations amplified. Pacific Fish., **16**, no. 5, p. 39–43.

Regulations applying to sardine canning and reduction in Californ as set forth by Norman Hendrickson, director of investigations, Nation Canners Association.

1918.4. Greater depth for sardine nets. Pacific Fish., **16**, no. 9, p. 52.

Improvements in sardine fishing methods at San Diego, California.

cific Fisherman—Continued.

1918.5. Hearing on fishery investigations. Pacific Fish., **16**, no. 12, p. 23–24.

Extracts from a report on U. S. government fishery investigations; sardine fishing methods and gear; canning methods.

1918.6. Commercial stocks of canned and cured fish. Pacific Fish., **16**, no. 12, p. 51.

Report of U. S. government on commercial stocks of canned sardines, July 1, 1918.

1919.1. New sardine rules announced. Pacific Fish., **17**, no. 1, p. 56. *Reviewed in* Indus. Franç. Cons., 1919, **5**, no. 29, p. 253–254.

Food administration rules given for fishing and use of offal. (*From* Bull. no. 3 of U. S. Food Administration).

1919.2. New line of fish by-products equipment. Pacific Fish., **17**, no. 1, p. 35, 37.

Description and figure of fish reduction machinery, used largely for sardines.

1919.3. California sardines in England. Pacific Fish., **17**, no. 3, p. 76.

Need for improvement of pack to enter English market.

1919.4. Present status of sardine inspection service. Pacific Fish., **17**, no. 5, p. 75.

Sardine canning inspection in southern California.

1919.5. Needs of the sardine industry. Pacific Fish., **17**, no. 5, p. 76.

Industry of southern California.

1920.1. Sardine inspection regulations. Pacific Fish., **18**, no. 2, p. 75–76, 78.

California regulations for sardine canning.

1920.2. Review of California sardine industry in 1919, 1920, 1921, 1922, 1923. Pacific Fish., Stat. No., 1920, p. 128; 1921, p. 87; 1922, p. 82; 1923, p. 86; 1924, p. 85, 87.

Industrial conditions; list of sardine canners in Californa; statistics of pack beginning with 1912.

1921.1. Unfair competition in sardines. Pacific Fish., **19**, no. 2, p. 54.

Quotation from San Diego Union, San Diego, California, with above title (labeling sprats as sardines and its bearing on tariff).

1921.2. Salachini industry at Monterey. Pacific Fish., **19**, no. 2, p. 56.

Output of special pack of dry-salt pressed sardines.

1921.3. Sardine by-products interests win fight. Pacific Fish., **21**, no. 6, p. 7–8.

New regulations passed by California state legislature.

1921.4. A modern California fish cannery. Pacific Fish., **19**, no. 7, p. 14–16.

Description and illustrations of sardine cannery at Long Beach, California.

1924.1. New sardine reduction problem. Pacific Fish., **22**, no. 2, p. 54, 56.

Question—what proportion of catch shall be turned into fertilizer?

1924.2. Purifying sardine fryer oil. Pacific Fish., **22**, no. 4, p. 15.

Canning practices, southern California.

1924.3. British Columbia pilchards for by-products. Pacific Fish., **22**, no. 8, p. 10–11.

General discussion of proposal: abundance; depletion; possibility of developing other uses for pilchards.

1925.1. Decision in California reduction case. Pacific Fish., **23**, no. 4, p. 11, 21.

Sardine reduction decision.

1925.2. Commission fixes sardine allowance. Pacific Fish,. **23**, no. 9, p. 106.

Regulations regarding number of cases to be packed from every ton of fish (remainder reduced to fertilizer).

1925.3. California sardine inspection. Pacific Fish., **23**, no. 12, p. 60.

Regulations adopted for inspection of pack in California.

1926.1. Improvement of methods in the California sardine canneries. Pacific Fish., **24**, no. 3, p. 12, 32.

Description of inspection regulations and improved machinery.

Pacific Fisherman—Continued.

1926.2. Remarkable growth of Vancouver Island pilchard industry. Pacific Fish 24, no. 8, p. 7–10.

Manufacture of oil and meal; fishing methods and gear.

1926.3. New pilchard reduction plants elaborately equipped. Pacific Fish., 2 no. 8, p. 11–12, 40.

Description of equipment of Vancouver Island pilchard reduction plan

1926.4. The California tuna and sardine industries in 1925. Pacific Fish. Sta No., p. 109–113.

Market and fishery conditions in California; statistics of Californ pack, 1912–1925.

1927.1. Herring and sardine oils rich in antirachitic vitamin. Pacific Fish., 2 no. 1, p. 16–17.

General discussion of subject.

1927.2. Scientific analysis of California sardine fishery. Pacific Fish., 25, no. p. 20–21.

Review of Calif. Fish Game Comm., Fish Bull., 1926, no. 11.

1927.3. Tuna pack of 1926 lightest in years; sardine industry growing. Pacif Fish. Stat. No., p. 164–169.

Market and fishery conditions in California and British Columbia; st tistics of pack, 1912–1926; list of reduction plants on Vancouver Islan

1928.1. Sardine canners adopt new methods. Pacific Fish., 26, no. 1, p. 34.

New canning methods and machinery described.

1928.2. New can draining machinery. Pacific Fish., 26, no. 8, p. 32.

Description and figure of new device for sardine canning.

1928.3. Monterey sardine catches show unusual fluctuation. Pacific Fish. Sts No., p. 143–144.

Monterey, California, sardine industry; statistics of pack, 1912–192

1928.4. Tuna and sardine seasons reviewed by various operators. Pacific Fis Stat. No., p. 146–149.

California sardine industry; statistics of exports from United State 1924–1927.

1928.5. Pacific coast fish oil production sets another record. Pacific Fish. Sta No., p. 198–200, 204, 206, 208.

Production of pilchard oil and meal in California and British Columbi statistics of oil and meal.

1929.1. New decisions on sardine reduction. Pacific Fish., 27, no. 3, p. 29.

Litigation in California over amount of sardines permitted for reducti to fertilizer.

1929.2. California sardine reduction controversy. Pacific Fish., 27, no. 4, p. 46.

Litigation in California over amount of sardines permitted for reducti to fertilizer.

1929.3. California sardine legislation. Pacific Fish., 27, no. 6, p. 34; no. 7, p. 4

Litigation in California over amount of sardines permitted for reducti to fertilizer.

1929.4. Sardine spawning area located. Pacific Fish., 27, no. 8, p. 40.

Discovery by E. C. Scofield of sardine eggs and larvae off Point Vicen southern California.

1929.5. Purse seines displace lamparas. Pacific Fish., 27, no. 8, p. 41–42.

Change in sardine fishing gear at Monterey, California.

1929.6. Export association would stabilize sardine trade. Pacific Fish., 27, no. p. 18, 22.

Movement to unite cannery men in California.

1929.7. An active year in the sardine industry of California. Pacific Fish. St No., p. 176–178.

Sardine industry.

fic Fisherman—Continued.

29.8. The year's developments in tuna and sardine markets. Pacific Fish. Stat. No., p. 179–180.

Sardine industry in California.

29.9 California sardines gain world-wide recognition. Pacific Fish Stat. No., sardine section, 24 pp.

Increase of world markets; methods and gear; canning methods; standardizing pack; dietetic importance (food and iodine value); statistics of exports from United States, 1925–1928.

30.1. Sardine association plans broader scope. Pacific Fish., **28,** no. 6, p. 16–17, 19.

New plans for cooperation among canners.

30.2. The Gross kitchen process. Pacific Fish., **28,** no. 10, p. 24–25.

Method of sardine canning described.

30.3. Two new sardine baking methods. Pacific Fish., **28,** no. 11, p. 23–24.

New methods of canning used at Monterey, California, described.

30.4. California sardines canned in record volume. Pacific Fish. Stat. No., **28,** no. 2, p. 147–148, 150, 152.

Statistics of pack, 1912–1929; changes and improvements in industry.

30.5. Hooper foundation studies California problems. Pacific Fish. Stat. No., **28,** no. 2, p. 155, 157.

Sardine canning investigations.

30.6. Exports of canned sardines from the United States, 1926–1929. Pacific Fish Stat. No., **28,** no. 2, p. 156–157.

Statistics: amounts and value.

30.7. Mirror of the markets for sardines and tuna. Pacific Fish. Stat. No., **28,** no. 2, p. 158.

Market conditions for California sardines.

31.1. California sardine production cut by economic influences. Pacific Fish. Stat. No., p. 147.

Condition of industry.

31.2. Fish oil and meal output declines. Pacific Fish. Stat. No., p. 217.

Statistics of sardine by-products in California and British Columbia.

31.3. Sardine pack is estimated about half that of preceding season. Pacific Fish., **29,** no. 4, p. 36.

Condition of California sardine industry.

31.4. Storied waters supply tuna bait. Pacific Fish., **29,** no. 5, p. 27–28.

Sardines, anchovettas and menhaden taken in Magdalena Bay, Lower California, in immense quantities as bait.

31.5. Herring and pilchard oil sold at low price; early production proves heavy. Pacific Fish., **29,** no. 9, p. 83.

Oil market.

as, *Peter Simon.*

31. Zoographia Rosso—Asiatica, sistens omnium animalium in extenso Imperio Rossico et adjacentibus maribus . . . Petropoli, **3,** p. 204–208.

Clupea piltschardus described.

do, *Garcia Luis.*

19. Avance de un catálogo de nombres vulgares de la fauna valenciana. Inst. Gen. Tec. Valencia, An., **3,** no. 14, p. 19.

Sardina, common name for *Clupea sprattus* and *C. sardina.*

21. Las colecciones de peces del instituto general y técnico de Valencia. Inst. Gen. Tec. Valencia, An., **8,** Trab. 35, p. 26, 80.

Clupea pilchardus: synonomy; common names in Spain.

Parnell, *Richard.*

1838. Natural and economical history of the fishes, marine, fluviatile, and lacustrine, of the river district of the Firth of Forth. Wernerian Nat. Hist. Soc., Mem. [for 1831–37] **7**, p. 320–322.

Clupea pilchardus: description; coloration; habits; migrations.

Parr, *Albert Eide.*

1930. Is the presence of phytoplankton in the stomach contents of the California sardine caused by special pursuit or merely due to incidental ingestion? Ecology, **11**, no. 2, p. 465–468.

Criticism of Lewis, 1929.

Patterson, *Arthur H.*

1897. The marine and fresh-water fishes of Great Yarmouth and its neighboring coasts, rivers and broads. Zoologist, 4. ser., **1**, p. 562.

Clupea pilchardus recorded.

Paucă, *M.*

1929. Vorläufige Mitteilung über eine fossile Fischfauna aus den Oligozänschiefern von Suslănești (Muscel). Acad. Roumaine, Bull. Sec. Sci., **12**, no. 4–5, p. 27.

Description of fossils of *Clupea sardinites* from Oligocene of Rumania.

Pavone, *Angelo.*

1926. Sterilizzazione delle scatole di sardine e di tonno. Boll. Pesca Piscicolt Idrobiol., **2**, no. 4, p. 29–32.

Sterilization of sardine cans.

Pêche Maritime.

1923. Le "bolinche" est autorisé dans le quartier de Bayonne. Pêch. Marit., 6 no. 286, p. 825.

"Bolinche" net authorized to operate in Bayonne district; legal regulations given.

1924.1. La question du sel à bord des sardiniers pêchant sur les côtes du Maroc Pêch. Marit., **7**, no. 293, p. 2.

Salt tax and the sardine fishermen of Moroccan coast.

1924.2. Importation de poisson et de sardine en 1922, dans l'Afrique occidental française. Pêch. Marit., **7**, no. 313, p. 325.

Statistics of sardine importations of French East Africa.

1924.3. Les "cercos" employés pour la pêche de la sardine au Portugal. Pêch Marit., **7**, no. 321, p. 476.

Portuguese sardine net described.

1924.4. Le "crabe à sardine" et ses méfaits dans la baie de Concarneau. Pêch Marit., **7**, no. 326, p. 572–573.

A crab in large numbers spoiling fishing in bay of Concarneau.

1924.5. L'union des syndicats de l'alimentation demande au government d'autoriser l'emploi des grands filets pour la pêche de la sardine. Pêch. Marit., no. 335, p. 750.

Appeal to reduce high price of sardine by use of large nets.

1925. La réglementation de l'usage des filets traînants dans la pêche côtière Algérie. Pêch. Marit., **8**, no. 395, p. 799.

Regulations for use of "filet trainant" on Algerian coast.

1926.1. Droits de douane sur le sel destiné à la salaison, à bord, des sardines pêchées sur la côte du Maroc. Pêch. Marit., **9**, no. 402, p. 83.

Justification of duty on salt to be used for curing sardines on board sh (France).

1926.2. L'usage des filets tournants et coulissants est autorisé dans le quartier d Guilvinec. Pêch. Marit., **9**, no. 421, p. 387.

Ban lifted on certain kinds of nets.

ne Maritime—Continued.

926.3. Le coût de l'armement d'un sardinier breton. Pêch. Marit., **9**, no. 424, p. 434.

Cost of equipping a Brittany sardine boat.

926.4. Repérage des bancs de sardines par dirigeable. Pêch. Marit., **9**, no. 436. p. 626.

Locating sardines by dirigible, west coast of France.

926.5. L'emploi des filets tournants tend à se développer en Bretagne. Pêch. Marit., **9**, no. 436, p. 627.

Greater use of net, "filet tournant," in Brittany.

926.6. Recherches des bancs de sardines à l'aide de dirigeables. Pêch. Marit., **9**, no. 437, p. 645.

Dirigible used to survey sardine fishery, west coast of France.

927.1. L'état du conflit sardinier. Pêch. Marit., **10**, no. 475, p. 421.

Conflict regarding French sardine fishery; quarrel between fishermen, buyers and canners.

927.2. La fin prochaine du conflit sardinier. Pêch. Marit., **10**, no. 476, p. 436.

Settlement of conflict between sardine fishermen and buyers.

927.3. Un nouvel appât pour la sardine. Pêch. Marit., **10**, no. 481, p. 517.

Artificial roe for sardine bait.

928.1+. Les résultats de la pêche au Maroc en decembre, 1927. Pêch. Marit., 1928+.

Sardine statistics in nearly every issue beginning with 1928.

928.2. Les possibilitiés d'installation d'usines de conserves à Collioure, port sardinier. Pêch. Marit., **11**, no. 512, p. 177.

Possibilities for installing sardine canneries at Collioure.

928.3. Nouvelle méthode américaine pour la conserve des fausses sardines. Pêch. Marit., **11**, no. 512, p. 182.

Calfornia process used for canning Maine "sardines."

928.4. Les résultats de l'accord entre les pêcheurs et les fabricants de conserves des Sables-d'Olonne. Pêch. Marit., **11**, no. 513, p. 593–595.

Results of agreement between fishermen and canners at Sables-d'Olonne.

928.5. La technique de la pêche à la sardine au Portugal. Pêch. Marit., **11**, no. 535, p. 545–546.

Sardine fishing methods and gear in Portugal; good explanation.

928.6. Les expériences d'ottesenisation des sardines à Lorient. Pêch. Marit., **11**, no. 537, p. 579.

Experiments in refrigeration of sardines.

928.7. La vente à Paris de la sardine des Sables-d'Olonne. Pêch. Marit., **11**, no. 538, p. 593–594.

Improvements in marketing methods increase sale of sardines in Paris.

929.1. L'éternal conflit sardinier. Pêch. Marit., **12**, no. 586, p. 513–514.

French fishermen's side of sardine question; abundance causing low price and misery among fisher folk.

929.2. Les résultats de la pêche au Maroc en juin, 1929. Pêch. Marit., **12**, no. 590, p. 579.

Sardine statistics of Morocco.

929.3. Les résultats de la pêche en Algérie en Août 1929. Pêch. Marit., **12**, no. 593, p. 629.

Sardine statistics of Algeria.

930.1. La congélation des sardines. Pêch. Marit., **13**, no. 614, p. 132.

Description of freezing experiments on sardines by the Ottesen process.

otto, *Benjamin F.*

884. The sea-fisheries of France and Algiers. U. S. Fish Comm., Bull. [for 1884] **4**, p. 417–418.

Sardine fisheries.

Pengelly, *Edwin.*

1928. Fish [pilchards] and fishermen of Cornwall. Nat. Hist., **28,** p. 656–662, 9 text figs.

Fisheries of Cornwall; methods of fishing and preservation of pilchards.

Pennant, *Thomas.*

1812. British zoology. **3,** p. 453–456.

Pilchard: description; season in England; methods of fishing; statistics.

Pentegoff, *B. P.*, and Niankovskaya.

1928. To the chemical investigation of the maritime sardine "iwashi" (*Clupea melanosticta*). Pacific Sci. Fish. Res. Sta., Bull., **1,** pt. 1, p. 310–312.

Chemical composition; table of results in English; text in Russian.

Pérard, *J.*

1909.1 La crise sardinière en 1909. Bull. Trim. Pêch. Marit., **14,** no. 2, p. 870–892. *Also in* Documents concernant la crise sardinière. 1903 à 1912 Réunis par Louis Amieux. 1912, 1. fasc., p. 89–91.

Recommendations for improvement of French sardine fishery.

1909.2. La valeur nutritive du poisson comparée à celle de la viande. Cong. Pêch. Marit., Sables-d'Olonne, C. R., **1,** p. 398–401.

Nutritive value of sardine; chemical composition.

1913.1. La crise sardinière en 1912–1913. Bull. Trim. Pêch. Marit., **18,** no. 2, p. 211–215.

Introduction to articles in this number of Bull. Trim. Pêch. Marit. on the French sardine crisis.

1913.2. Comment l'on prépare et l'on assure la conservation de la sardine. Bull. Trim. Pêch. Marit., **18,** no. 2, p. 252–273.

Sardine canning procedure in France, described and illustrated; utilization of by-products; costs of canning; other methods of preservation described.

1913.3 Procès-verbal de la séance du 8 mai, 1913. Bull. Trim. Pêch. Marit., **18,** no. 2, p. 374–380.

Discussion of sardine failure: credit for fishermen; new organization; price of bait; prohibiting use of seine.

Pergola, *M.*

† 1927. Nuovo episodio collettivo di intossicazione alimentare da sorelli (sardine) sott'olio. Italia San., **19,** p. 5.

Poisoning caused by sardine.

Perrier, *Louis.*

1903. La protection des pêches maritimes. Thèse pour le doctorat. Paris, p. 250–252.

Regulations governing the French sardine fishery.

Perugia, *Alberto.*

1866. Catalogo dei pesci dell'Adriatico. Trieste, p. 8.

Clupea sardina recorded.

Perwinck, *J. W.*

1919. État actuel de l'industrie des conserves de sardines aux États-Unis. Indus. Franç. Cons., **5,** no. 31, p. 364–366.

State of sardine industry in United States.

Petit, *Charles*, Benoit, *A.*, Rivoal, *Caradec*, and Touchard.

1913. Sentence arbitrale. Bull. Trim. Pêch. Marit., **18,** no. 2, p. 409–412.

Regulations for the prices paid fishermen for sardines.

Phillipps, *W. J.*

1921. Notes on the edible fishes of New Zealand. With a record of fishes exposed for sale in Wellington during 1918. New Zealand Journ. Sci. Tech., 4 no. 3, p. 118.

Sardinia neopilchardus recorded.

hillipps, *W. J.*—Continued.

1924. Sardines or pilchards in Wellington harbour. New Zealand Journ. Sci. Tech., **7**, no. 3, p. 191, 1 fig.

Sardina neopilchardus: large school in harbor; figure of fish.

1927. Bibliography of New Zealand fishes. New Zealand Mar. Dept. Fish. Bull., no. 1, p. 12.

Sardinia neopilcharda; synonomy cited with original authors.

1929. Notes on the pilchard (*Sardinia neopilchardus*) in Queen Charlotte sound. New Zealand Journ. Sci. Tech., **10**, no. 6, p. 343–345.

Habitat; methods of smoking; fishing methods; spawning season; distribution.

hillipps, *W. J.*, and Hodgkinson, *E. R.*

1922. Further notes on the edible fishes of New Zealand. New Zealand Journ. Sci. Tech., **5**, no. 2, p. 94.

Sardinia neopilchardus recorded.

hillips, *Julius B.*

1930.1. 1929–1930 season disastrous for Monterey sardine fleet. Calif. Fish Game, **16**, no. 3, p. 268–269.

Account of series of fires and wrecks of sardine fishing boats at Monterey, California.

1930.2. Change in fishing for Monterey sardines. Calif. Fish Game, **16**, no. 3, p. 269–270.

Sardine fishing methods and gear.

1930.3. Success of the purse seine boat in the sardine fishery at Monterey, California (1929–1930 fishing season). Calif. Div. Fish Game, Fish Bull., no. 23, 28 pp.

Comparison of purse seine and lampara gear; former taking place of latter.

oey y Aloy, *Felipe.*

1851. Memorias sobre la historia natural de la isla de Cuba, acompañadas de sumarios latinos y extractos en francés. Habana, 1851–1858, **2**, p. 311–312.

Sardinia pseudohispanica: description.

1856. Memorias sobre la historia natural de la isla de Cuba. Memorias, 1856–1858, **2**, p. 310.

Harengula sardina (sardine of Cuba): description. *Sardinia pseudohispanica* listed.

1865. Repertorio fisico-natural de la isla de Cuba. Habana, 1865–1868, **2**, p. 419.

Sardina pseudohispanica listed.

1881. Peces. *In* Apuntes para la fauna puerto-riqueña, *by* Juan Gundlach. Soc. Española Hist. Nat., An., **10**, p. 343.

Sardinia pseudohispanica listed.

olidor, _____.

1908. Situation de l'industrie des pêches maritimes en 1907. Cong. Nat. Pêch. Marit., Bordeaux, C. R., p. 118–119.

Sardine fishing methods and gear in France.

ontes y Avila, *Amando.*

1923. Réas bajas de Galicia. Bol. Pescas, **8**, no. 77–80, p. 5, 15, 48, 58. *Also in* La pesca marítima en España en 1920. Madrid, 1923, p. 373, 374, 375, 384, 385.

Sardine statistics.

ortugal. Ministério da Marinha.

_____. Estatistica das pescas marítimas. No continente e ilhas adjacentes no ano de . . . Lisboa. [Current.]

Annual report containing sardine statistics.

Potigny, *A.*

1908. Rapport . . . sur les questions relatives à l'emploi de la rogue pour la pêche de la sardine. *In* Documents relatifs à la crise sardinière, 1903–1907. France Min. Mar., p. 33–64.

Review of bait situation in France; artificial "roe" or bait.

Potigny, *A.*, and Fabre-Domergue, *Paul.*

1908. Rapport . . . au suject des procédés de pêche de la sardine en Espagne et au Portugal. *In* Documents relatifs à la crise sardinière, 1903–1907. France Min. Mar., p. 65–93.

Methods, gear and industry in both Spain and Portugual.

Pouchet, *Georges.*

1887.1. L'emploi des seines à sardines. Nantes.

Plea for use of seine in sardine fishery.

1887.2. L'industrie de la sardine et le laboratoire de Concarneau. Revue Sci., 3. sér., **13**, p. 519–520.

Outline of what this laboratory has done and expects to do concerning sardine question.

1887.3. La question de la sardine. Revue Sci., 3. sér., **13**, p. 737–746.

(1) Scientific aspect: reasons for variations in fishery; possibility of depletion by overfishing. (2) Economic aspect: competition from other countries; condition of fishermen; laws regulating fishery; discussion of advantages and bad effects of use of "le filet Guezennec" (purse seine").

1888.1. Le régime de la sardine sur la côte océanique de France en 1887. Note présentée à l'Académie des sciences dans la séance du 20 février, 1888. *Abstract in* Acad. Sci. Paris, C. R., **106**, p. 554–556.

Description of sardine season in 1887; size and abundance.

1888.2. La sardine. Revue des Deux Mondes, Paris, **86**, 3. livr., April, p. 645–669.

Popular description of sardine fishery and industry of France; discussion of history; regulations of fishery and reasons for latter.

1889.1. Rapport au ministre de l'instruction publique sur le fonctionnement du laboratoire de Concarneau en 1888, et sur la sardine. Journ. Anat. Physiol., Paris, **25**, p. 390–399.

Measurements at different seasons; sexual maturity at different sizes; correlation of plankton and meteorologic conditions with presence of sardine; study of eggs (poor drawing); growth (curve given).

1889.2. Le "régime" de la sardine. Revue Sci., 3. sér., **18**, p. 239–241.

Discussion of sizes and possibility of using figures from commercial catch.

1889.3. Le régime de la sardine en 1888 sur la côte bretonne. Acad. Sci. Paris, C. R., **109**, p. 34–35.

Sardine season, Brittany, 1888; uniform size of fish.

1889.4. Sur des graphiques représentant le "régime" de la sardine. Soc. Biol. Paris, C. R., 9. sér., **1**, p. 509–510.

Description of a graph showing the size of sardines for each day of the 1881 season, but graph not given.

1889.5. Sur l'oeuf de la sardine. Acad. Sci. Paris, C. R., **109**, p. 119–120.

Description of sardine egg; spawning; age at sexual maturity.

1889.6. Sur las croissance de la sardine océanique. Acad. Sci. Paris, C. R., **109**, no. 5, p. 199.

Growth of Atlantic sardine.

1890.1. Rapport sur le fonctionnement du laboratoire de Concarneau en 1889 et sur la sardine. Journ. Anat. Physiol., Paris, **26**, p. 620–629, 639–669.

Size of fish and sexual maturity shown in graphs for different localities for whole season; statistical tables.

1890.2. La sardine de la Méditerranée. Revue Sci., 3. sér., **19**, p. 588–590.

Migrations; growth.

ouchet, *Georges*—Continued.

1891.1. Rapport à M. le ministre de l'instruction publique sur le fonctionnement du laboratoire de Concarneau en 1890 et sur la sardine. Journ. Anat. Physiol., Paris, **27**, p. 625–647.

Statistical tables for different ports showing size; eggs and spawning.

1891.2. Sur la sardine. Rapport à M. le ministre de l'instruction publique. Revue Sci. Nat. Ouest, **1**, p. 156–163.

Condition of fishery in 1889–1890; sizes caught at different stations; sexual maturity; migrations; possibility of depletion by overfishing.

1891.3. Nouvelles observations sur la sardine océanique. Acad. Sci. Paris, C. R., **112**, p. 744–745.

Comparison of Atlantic with Mediterranean form.

1891.4. Sur le "régime" de la sardine océanique en 1890. Acad Sci. Paris, C. R., **113**, p. 1064–1066.

Unusual variety in size of sardines of 1890 season; discussion of sardine eggs.

ouchet, *Georges*, and Biétrix, *Eugène*.

1892. Sur des sardines présentant des oeufs à maturité. Soc. Biol. Paris, C. R., 9. sér., **4**, p. 423–424.

Summary of report of Laboratoire de Concarneau for 1888; size of sardines and sexual maturity at different seasons.

ouchet, *Georges*, and Guerné, *Jules de*.

1887. Sur la nourriture de la sardine. Acad. Sci. Paris, C. R., **104**, pt. 1, p. 712–715.

Food.

rince, *Edward E.*

1907. The eggs and early life-history of the herring, gaspereau, shad and other clupeoids. Canada Dept. Mar. Fish., 39. Rept., p. 95–110.

Clupea pilchardus: eggs and larvae described and figured.

Q

uibbon.

1925. Sardines and cod-liver oil. Fish Trades Gaz., **43**, no. 2189, p. 21.

Statistics of European imports and exports of sardines.

1927. The Californian industry. Fish Trades Gaz., **45**, no. 2316, p. 25.

Sardine industry in California.

R

abillier, *Gracieux*.

1909. La pêche de la sardine aux Sables-d'Olonne. Cong. Pêch. Marit., Sables-d'Olonne, C. R., **1**, p. 162–167.

Fishery at Sables-d'Olonne.

adcliffe, *Lewis*.

1920. Fishery industries of the United States. U. S. Comm. Fish., Rept. [for 1918] (Doc. 875), p. 52, 54, 141, 144, 147, 155, 158, 159, 160.

Sardine statistics.

1921. Fishery industries of the United States. U. S. Comm. Fish., Rept. [for 1921] (Doc. 908), p. 57–59, 149–151.

Statistics of fishery for California sardine (*Sardina caerulea*) and for Maine "sardine" (*Clupea harengus*).

1923.1. Trade in canned sardines. Pacific Fish., **21**, no. 7, p. 14.

Review of development of California sardine industry; statistics.

1923.2. Fishery industries of the United States. U. S. Comm. Fish., Rept. [for 1922] p. 17, 75, 76.

Statistics of sardine—Maine and California.

Radcliffe, *Lewis*—Continued.

1923.3. Fisheries and market for fishery products in Mexico, Central America, South America, West Indies, and Bermudas. U. S. Comm. Fish., Rept. [for 1922] p. 30, 32, 36, 80, 83, 85, 86,.

Sardines: statistics of importations into Mexico.

Raffaele, *Federico.*

1888. Le uova galleggianti et le larve dei teleostei nel golfo di Napoli. Zool. Sta. Neapel, Mitt., **8,** p. 55–57, 79, pl. 1, 2.

Eggs and larvae of sardine (*Clupea pilchardus*); plates show many stages of egg and larva.

Ramalho, *Alfredo.*

1927. A sardinha em Portugal. Notas biológicas. Sta. Biol. Lisbonne, Trav., no. 14, p. 6–29.

Sardina pilchardus: fishery in Portugal; distribution (world map); spawning; growth; eggs; sexual maturity; scale readings.

1929. Contribution à l'étude des races de la sardine (*Sardina pilchardus* Walb.) au Portugal, à Madeira et aux Açores. Cons. Explor. Mer, P. V., **54,** p. 46–55. *Reviewed in* Pêch. Marit., 1929, **12,** no. 585, p. 502–503; no. 586, p. 516.

Races of sardines off coast of Portugal, based on vertebral counts, head length, time and place of spawning.

Ramalho, *Alfredo,* and **Boto,** *R.*

1930. Sur la relation entre la croissance de la sardine et celle des écailles. Soc. Biol. Lisbonne, C. R., 1930, **106,** p. 562. (Sta. Biol. Marit. Lisbonne, Trav., 1931, no. 26, 3 pp.)

Relation between growth of *Sardina pilchardus* and growth of the scales.

Ramsay, *E. P.*

1883. Notes on the food fishes and edible mollusca of New South Wales. Intern. Fish. Exhib. Lit., **5,** p. 30.

Clupea sajax: season of migrations; present in great abundance.

Raulin, *G. de.*

1925.1. L'industrie de la pêche. Paris, p. 48–52.

Description of French sardine boats.

1925.2. Le commerce des rogues en France. Pêch. Marit., **8,** no. 369, p. 386.

Manufacture of bait from sardines.

Ravertet-Wattel, *Casimir.*

1909. Atlas de poche des poissons de mer de la France et de la Belgique. *In* Bibliothèque de poche du naturaliste, **17,** p. 68, 153–160, 177–182.

Alosa sardina: figured; described; food; habits; larvae figured and described; reasons for variable fishery: temperature, food and currents; fishery in Europe (especially France); fishing methods and gear in France; canning methods.

Ray, *John.*

1713. Synopsis methodica avium et piscium; opus posthumum. Londini, p. 104.

Sardina described.

Regan, *Charles Tate.*

1916.1. The British fishes of the sub-family Clupeinae and related species in other seas. Ann. Mag. Nat. Hist., sér. 8, **18,** no. 103, p. 14. pls. 1–3.

Sardina pilchardus, S. pilchardus sardina, S. sajax, S. neopilchardus: synonomy; description; distribution (world map showing distribution). Spawning and growth of *S. pilchardus* and *S. sajax.* Figures of *S. sajax* and *S. neopilchardus.*

1916.2. Larval and post-larval fishes. British Antarctic (Terra Nova) Expedition, 1910, zool., **1,** no. 4, p. 136, pl. 5, figs. 3, 4.

Sardina neopilchardus from New Zealand: larvae described and figured.

egan, *Charles Tate*—Continued.

1917. A revision of the clupeoid fishes of the genera *Pomolobus*, *Brevoortia*, and *Dorosoma*, and their allies. Ann. Mag. Nat. Hist., sér. 8, **19**, p. 308–309.

Clupanodon thrissa, C. punctatus: synonomy; description; distribution.

eguart, *Antonio Sañez.*

1791. Diccionario historico de los artes de la pesca nacional por el comisario real de guerra de marina. Madrid, **2**, p. 233–269.

"Cerco real," a sardine net used off coast of Sardinia and Galicia, described and illustrated.

enduel, _____.

1888. Législation en matiére de pêche côtière et plus spécialement celle qui concerne la pêche de la sardine. Revue Marit. Colon., **97**, p. 555–562. *Also in* Journ. Off., 1887, **19**, no. 284, p. 4615–4616.

Information regarding the sardine fishery in reference to protective legislation.

evue Maritime.

1893. Situation de la pêche et de l'ostréiculture.

In each month's issue from 1893–1902, a section on statistics of sardine fishery, France.

1904. Situation de la pêche à la sardine, dans la circonscription consulaire de la Corogone. Revue Marit., **160**, p. 185–186.

Condition of sardine fishery in Spain.

ichard, *J.*

1904. Campagne scientifique du yacht "Princesse Alice" en 1903. Observations sur la sardine, sur le plankton, sur les cétacés, sur des filets nouveaux, etc., etc., avec résumé esperanto. Mus. Océanogr. Monaco, Bull., no. 11, p. 10.

Food.

ichardson, *John.*

1845. Report on the ichthyology of the seas of China and Japan. British Assoc. Adv. Sci., Rept., 15. meet., p. 305.

Clupea caerulea-vittata: description; coloration.

ichiardi, _____.

1875. Intorno al *Peroderma cylindricum* dell' Heller. Soc. Tosc. Sci. Nat. Pisa, Atti, **2**, p. 189–196.

Description of crustacean parasite of sardine.

idewood, *W. G.*

1891. The air-bladder and ear of British clupeoid fishes. Journ. Anat. Physiol., London, **26**, (n. s. **6**), p. 26–42, figs.

Clupea pilchardus: anatomy of air-bladder and ear.

isso, *Antoine.*

1810. Ichthyologie de Nice, ou histoire naturelle des poissons du département des Alpes-Maritimes. Paris, p. 352–353.

Clupea sardine: description.

1826. Histoire naturelle des principales productions de l'Europe méridionale et particulièrement de celles des environs de Nice et des Alpes Maritimes. Poissons. Paris, **3**, p. 451.

Clupanodon sardina, C. pilchardus: description.

oach, *William.*

1890. Notes on the herring, long-line, and pilchard fisheries of Plymouth during the winter 1889–90. Mar. Biol. Assoc., Journ., n. s. **1**, no. 4, p. 382–390.

Catch statistics; number of fish per boat; price per 1000 fish.

1891. Notes on the herring, long-line, and pilchard fisheries of Plymouth (continued). Mar. Biol. Assoc., Journ., n. s. **2**, p. 186–188.

Catch statistics; number of boats; catch of fish per boat; price; locality.

Roberts, *William.*

1871. Quantities of pilchards exported from Cornwall, and prices at which they were sold; from 1815 to 1871. R. Instn. Cornwall, Journ., 1871–73, 4, p. 159–161.

Statistical tables showing the above.

Roché, *Georges.*

1893.1. Observation sur la nourriture de la sardine. Soc. Philom., Bull., 8. sér., 5, (C. R. no. 13, p. 10–11).

Food of sardine.

1893.2. Note sur le développement de la sardine (*Alosa sardina* Cuv.). Soc. Philom., Bull., 8. sér., 5, (C. R. no. 20, p. 4–5).

Eggs and larvae.

1893.3. La crise sardinière et les sciences biologiques maritimes. Revue Gén. Sci., 4, p. 308–313.

Outline of facts of sardine failure and periodic disappearance of sardine; work (in Europe and America) being done to discover causes; outline of facts and theories of reproduction.

1894.1. Les grandes pêches maritimes modernes de la France. Paris, p. 38–43, 69–74, 107–108, 130–138.

Sardine fishing methods and gear; boats; salting methods; reasons for sardine failure; summary of research by investigators (Pouchet, Marion and Cunningham).

1894.2. Les pêches maritimes modernes de la France. *In* Encyclopédie scientifique des aide-mémoire. Section biologiste. Paris, p. 38–43, 107–108, 130–138.

Methods and gear; fishing seasons; methods of canning and salting; sardine failure, its causes and history.

1894.3. La pêche maritime en Algérie. Revue Marit. Colon., 121, p. 166–168.

"Sardinal," sardine net, effect on fishery (destructiveness to young sardines).

1894.4. Note sur les conditions du développement de la sardine. Ann. Sci. Nat. (Zool.), 7. sér., 16, p. 328–330.

Growth of sardines.

Rodel, *Albert.*

1912. Les remèdes à la crise sardinière. *Communication presented to the* Congrès des sociétés savantes, tenu à Bordeaux en 1903 (section de zoologie). *In* Documents concernant la crise sardiniére. 1903 à 1912. Réunis par Louis Amieux. Nantes, 1. fasc., p. 161–168.

Suggestions for improvement of sardine fishery in France.

1913. La pêche à la sardine à Arcachon par les bateaux à moteur. Bull. Trim. Pêch. Marit., 18, no. 2, p. 230–243, 2 pls.

Sardine motor boat fishing at Arcachon.

Rodriguez, *Benigno.*

1908. La sardina en la provincia de Santander. Spain Mar. Merc. Pesc., An. Estadís. [for 1907] p. 176–220.

Migrations; season for fishing; fishing methods and gear; food; spawning; economic effect of sardine failure on country; causes of failure and means of avoiding same.

Roldán, *José María.*

1921. Costas vascas. Bol. Pescas, 6, no. 64, p. 385–388. *Also in* La pesca marítima en España en 1920. Madrid, 1923, 2, p. 141–142.

Sardine statistics.

Rondelet, *Guliemus.*

1554. Libri de piscibus marinis, in quibus verae piscium effigies expressae sunt. Lugduni, libri 7, p. 217.

"De sardinis" described and figured.

1558. L'histoire entière des poissons. Lion, p. 181–182.

Sardine and celerin both described and figured.

pers, *Louis.*

1906. La crise sardinière. Condition économique et sociale du pêcheur sardinier. Paris, 299 pp.

Economic conditions; cost of gear and wages of fishermen; organization of a fishing crew; living and social conditions of fishermen; suggestions for improving conditions; ways of protecting fisheries and increasing them; theories of sardine migrations, habitat, food, reproduction, hydrographic conditions (currents, winds and electricity); suggestions for improving gear, and increase in profit from fishery; bibliography.

ughly, *T. C.*

1916. Fishes of Australia and their technology. Tech. Mus. Sydney, Tech. Ed. Ser., no. 21, p. 13–15.

Clupanodon neopilchardus: description; color; distribution; habits; food; methods of capture.

uillon, *E.*

1898. Coopération des marins pêcheurs. Revue Marit., **138**, 443 liv., p. 385–402.

Plans for organization of sardine fishermen: buying of gear, selling of fish; insurance protection against poor years.

ule, *Louis.*

1914. Traité raisonné de la pisciculture et des pêches. Paris, p. 308–315.

Alosa sardina: adult, eggs and larvae described and figured; distribution; habitat; fishing seasons (Europe); food; spawning season; incubation.

1919. Poissons provenant des campagnes du yacht Princesse Alice (1891–1913) et du yacht Hirondelle (1914). Rés. Camp. Sci. Monaco, fasc. 52, p. 129.

Alausa pilchardus listed.

1929. Les poissons et le monde vivant des eaux. Études ichthylogiques. Tome III. Voyages et migrations. Paris, p. 195–209.

Sardina pilchardus: time of fishing season in Spain and France; optimum temperature 13°–23° C.; growth; migrations.

ule, *Louis*, and Angel, *Fernand.*

1924. Notice préliminaire (IV^e^ et dernière) sur les larves et les alevins de poissons recueillis par S. A. S. le Prince Albert I^er^, de Monaco dans ses croisières (années 1905 à 1915). Inst. Océanogr. Monaco, Bull., no. 451, p. 2.

Young sardines collected from two stations.

ussell, *E. S.*

1915. Report on log-book records relating to mackerel, pilchards and herring, kept by fishermen during the years 1895–1911. England Min. Ag. Fish., Fish. Invest., ser. 2, **3**, no. 1, p. 9, 22–25.

Pilchard nets; statistics of catch.

ussell, *F. S.*

1926. The vertical distribution of marine macroplankton. II. The pelagic young of teleostean fishes in the daytime in the Plymouth area, with a note on the eggs of certain species. Mar. Biol. Assoc., Journ., n.s. **14**, no. 1, p. 112, 395–401.

Sardina pilchardus: vertical distribution of young fish.

1930. The seasonal abundance and distribution of the pelagic young of teleostean fishes caught in the ring-trawl in offshore waters in the Plymouth area. Mar. Biol. Assoc., Journ., n.s. **16**, no. 3, p. 711.

Clupea pilchardus: seasonal variations in abundance, 1924–1926.

usso, *Achille.*

1925. Studî sulla pesca nel golfo di Catania. Parte prima. La tratta e la pesca delle sardine. Boll. Pesca Pisciolt. Idrobiol., **1**, fasc. 2, p. 1–39, 44–55.

Fishery of Sicily; fishing methods and gear; illustrations; probable causes of abundance of sardine; eggs; sexual maturity; statistics and value of fishery.

S

Sadler, *Wilfrid.*

1918. The bacteriology of swelled canned sardines. American Journ. Pub. Health 8, p. 216–220. *Also in* Canada Fish. Branch Rept. [for 1917–1918] Contrib. Canadian Biol., no. 12, p. 179–215.

Work done on "sardines" (small herrings) at Atlantic Biological Station, St. Andrews, N. B.

1921. Canned sardines. The cause of "swells" or "blown cans." Canada Fish. Branch, Rept. [for 1918–1920] Contrib. Canadian Biol., no. 10, 103–108.

Study of bacteriology of spoilage in canned sardines (small herring east coast of Canada).

Saint-Léon, *Martin,* and **Seilhac,** *Léon de.*

1913. La crise sardinière. *In* Bibliothèque du musée social. Paris, 204 pp.

Fishery in Brittany; manufacture of products; history of sardine fa ure and results of inquiry into causes; recommendations for remedyi conditions; statistics of French and English fisheries; laws regulating t fishery; arbitration concerning the sardine failure.

Saint-Sévrin, _____ *du Bois.*

1894. Panaris des pêcheurs et microbe rouge de la sardine. Inst. Pasteur, An 8, p. 152–160. *Also in* Arch. Méd. Navale, 1894, 61, p. 448.

Disease of fishermen resulting from eating sardines.

Santamaría, *Benigno Rodríguez.*

1923. Diccionario de artes de pesca de España y sus posesiones. Madrid, 166–170, 729–733.

Sardine fishing methods and gear; regulations.

Sanz, *Luis Alaejos. See* **Alaejos Sanz,** *Luis.*

Sauvage, *Henri Émile.*

1865. Les poissons et les crustacés. *In* Marveilles de la nature, edited by A. Brehm. Paris, p. 536–542.

Alosa sardina: description; distribution; habits; migrations; foo French, Spanish and English fishing methods and gear described in deta French methods of preservation and canning.

1886. La nourriture de la sardine sur les côtes du Boulonnais. Soc. Zool. Franc Bull., 11, p. 621–622.

Food of sardine.

1889. Sur la nourriture de quelques poissons de mer. (2e note.) Revue Gé Sci., 4 sér., 6, p. 961–964.

Food of *Alosa sardina.*

1890. De la présence du célan sur les côtes du Boulonnais. Soc. Nat. Acclimat Bull., 37, p. 699.

Measurements, food and parasites of a sardine found on the coast Boulogne in December.

1893. Examen de l'état de maturité sexuelle de quelques poissons de mer. S Aqui. Boulogne-sur-Mer, Ann., 1, pt. 2, p. 96–98.

Alosa sardina: studies on sexual maturity.

Schonevelde, *Stephanus A.*

1624. Ichthyologia et nomenclaturae animalium marinorum, fluviatilium, lac trium, quae in florentissimis ducatibus Slesvici et Holsatiae et Empo Hamburgo occurrunt triviales; ac plerorumque hactenus desiderato imagines, breves descriptiones et explicationes. Hamburgi, p. 66.

Brief mention of sardine as being caught along coast of Schlesw Holstein.

Scofield, *Eugene C.,* and **Lindner,** *Milton J.*

1930. Preliminary report of the early life history of the California sardine. contribution from the hydrobiological survey.) Calif. Fish Game, 16, 2, p. 120–124.

Description of methods of investigation; eggs and larvae described a figured; complete series up to 3.5 mm. collected.

cofield, *Norman Bishop.*

1917. Commercial fishery notes. Calif. Fish Game, 3, no. 4, p. 179–180.
Possibility of increasing sardine industry in California.

1918. Report of the department of commercial fisheries. Calif. Fish Game Comm., 25. Bienn. Rept. [for 1916–1918] p. 60.
Growth of sardine industry in California.

1919.1. Commercial fishery notes. Calif. Fish Game, 5, no. 1, p. 41.
Suggested use of aeroplane to locate schools of sardines.

1919.2. Commercial fishery notes. Calif. Fish Game, 5, no. 3, p. 154.
15,630,000 pounds of sardines used in manufacture of fish meal at San Pedro during January-April, 1919.

1919.3. Commercial fishery notes. Calif. Fish Game, 5, no. 4, p. 197, 198.
Sardine season at Monterey; dry salting of sardines.

1921.1. Report of the department of commercial fisheries. Calif. Fish Game Comm., 26. Bienn. Rept. [for 1918–1920] p. 54–62.
Statistics of fisheries; methods of gathering statistics; program of sardine investigations.

1921.2. Commercial fishery notes. Calif. Fish Game, 7, no. 2, p. 124.
Very large quantities of sardines used as fertilizer, perhaps endangering supply; market conditions.

1922. California sardines considered herring by Chilean customs officials. Calif. Fish Game, 8, no. 2, p. 132.
Note on ruling of Chilean government raising duty on sardines from 30 cents per kilo to $1.20.

1923.1. Report of the department of commercial fisheries. Calif. Fish Game Comm., 27. Bienn. Rept. [for 1920–1922] p. 75–77, 78–81.
Description of sardine investigation on age and rate of growth; litigation and regulations in regard to reduction to fertilzer.

1923.2. Who are the conservationists. The lampara net. Calif. Fish Game, 9, no. 4, p. 170.
Legislation in regard to purse seine and lampara net.

1924.1. The lampara net. Calif. Fish Game, 10, no. 2, p. 66–70.
Methods of using this net in catching sardines; case for and against it as a destroyer of other fish with insufficient evidence to condemn it.

1924.2. The purse seine. Calif. Fish Game, 10, no. 4, p. 182–186.
Description and diagram of this net and its use in sardine fishery.

1924.3. Report of the department of commercial fisheries. Calif. Fish Game Comm., 28. Bienn. Rept. [for 1922–1924] p. 48–50.
Increase of sardine industry; regulations in regard to reduction of fish to fertilizer.

1925. Sardine fishery of India. Sardine possibilities in New South Wales. Sardines and herring may be used for fertilizer in British Columbia. Calif. Fish Game, 11, no. 2, p. 84–86, 87,
Fishing methods and methods of preservation in India; abundance of *Sardina neopilchardus* in New South Wales; fish may be caught in British Columbia to convert into fertilizer.

1927. Report of the department of commercial fisheries. Calif. Fish Game Comm., 29. Bienn. Rept. [for 1924–1926] p. 63–67.
Litigation over reduction of sardines to fertilizer; growth of industry; statistics.

1928.1. Report of the bureau of commercial fisheries. Calif. Fish Game Comm., 30. Bienn. Rept. [for 1926–1928] p. 105–112.
Summary of catch figures and organization of canners; cannery inspection; cannery research; litigation in connection with floating reduction plants which operate outside of three-mile limit to evade state laws.

Scofield, *Norman Bishop*—Continued.

1928.2. Sardine scarcity at Monterey. Calif. Fish Game, 14, no. 1, p. 83–84.

Increasing scarcity of sardine supply.

1928.3. Why California sardines are caught at night rather than by day. Calif. Fish Game, 14, no. 3, p. 250.

Fishing methods in California.

1929.1. Conditions in the sardine fishery at San Pedro. Calif. Fish Game, 15, no. 2, p. 171.

Fishery conditions.

1929.2. Sardine season opens. Calif. Fish Game, 15, no. 4, p. 353.

Conditions in California industry.

1929.3. Unloading of sardines simplified. Calif. Fish Game, 15, no. 4, p. 355.

Suction, using seawater, speeds up process, besides scaling fish.

Scofield, *William Launcelot.*

1921. Fertilizer, stockfood and oil from sardine offal. Calif. Fish Game, 7, no. 4, p. 207–217.

Process of fish reduction; machinery described; method of recovering oil and making meal.

1923. The sardine season at Monterey. Sardine fishermen's strike at Monterey and settlement. Calif. Fish Game, 9, no. 4, p. 171–173.

Fishery and market conditions; terms of agreement drawn up between canners and fishermen.

1925.1. Average length of Monterey sardines. Calif. Fish Game, 11, p. 84.

Size variations in Monterey sardines.

1925.2. The 1924 commercial catch of fish in California. Calif. Fish Game, 11, no. 4, p. 162–167.

Statistics of sardine fishery.

1926.1. Purse seines for California sardines. Calif. Fish Game, 12, no. 1, p. 16–19.

Description of purse seine and its use; round haul or lampara described.

1926.2. The sardine at Monterey: dominant size-classes and their progression, 1919–1923. Calif. Fish Game Comm., Fish Bull., no. 11, p. 193–221. *Reviewed in* Pacific Fish., 1927, 25, no. 9, p. 21.

Fishing seasons from November, 1919, to March, 1923, studied; progression of size of fish discussed and represented in graphs; sexual dimorphism.

1927. Report of the state fisheries laboratory. Calif. Fish Game Comm., 2d Bienn. Rept. [for 1924–1926] p. 75.

Sardine investigation being continued.

1928.1. Sardine season at Monterey and Los Angeles harbor. Calif. Fish Game, 14, no. 3, p. 198–200.

Comparison of size of catch at two ports; statistics.

1928.2. The California sardine and tuna fisheries. Pacific Fish., Stat. No., p. 130.

Graph showing catches for three California districts, 1915–1926; importance of industry discussed.

1929.1. Opening date for the 1928–1929 sardine season. Calif. Fish Game, 15, no. 1, p. 72. *Also in* West Coast Fish., 1929, 1, no. 11–12, p. 32.

Cannery operations agreed upon to start August 6 at Monterey and October 6 at San Pedro for economy, not conservation.

1929.2. Cannery and market fish. *In* The commercial fish catch of California for the years 1926–1927. Calif. Div. Fish Game, Fish Bull., no. 15, p. 21–23.

Sardine canning cause of enormous jump in amount caught.

1929.3. Sardines. *In* The commercial fish catch of California for the years 1926–1927. Calif. Div. Fish Game, Fish Bull., no. 15, p. 23–27.

Enormous importance of sardines as compared with all other fish in statistics.

1929.4. California's sardine catch for the year 1928. West Coast Fish., June, p. 21.

Fishery of California; statistics.

field, *William Launcelot*—Continued.

930.1. Scarcity of small sardines. Calif. Fish Game, **16**, no. 1, p. 75.

Scarcity affecting tuna fishery (small sardines used as bait); may indicate depletion of these sizes.

930.2. Cannery and market fish. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish Game, Fish Bull., no. 20, p. 11–17.

Sardine statistics.

930.3. Sardines. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish Game, Fish Bull., no. 20, p. 22–24.

Enormous importance of sardines as compared with all other fish; statistics.

930.4. Sardine fishing methods at Monterey, California. Calif. Div. Fish Game, Fish Bull., no. 19, 61 pp. *Reviewed in* Calif. Fish Game, 1930, **16**, no. 3, p. 271; *and by* Quibbon *in* Fish Trades Gaz., 1930, **47**, no. 2439, p. 19.

Sardine fishing industry; fishing methods and gear.

931. Increasing utilization of cannery fish. *In* The commercial fish catch of California for the year 1929. Calif. Div. Fish Game, Fish Bull., no.. 30, p. 17.

Percentage of sardine poundage for 1929 used in canneries.

otland. Fishery Board.

892. Annual report. Scientific investigations. Scotland Fish. Bd., 10. Ann. Rept. [for 1891] Sci. Invest., p. 14. Review of article by W. Anderson Smith, 1892, in same report.

Sardine investigation in France.

ott, *Thomas.*

906. Observations on the otoliths of some teleostean fishes. Scotland Fish. Bd., 24. Ann. Rept., pt. 3, Sci. Invest., p. 78.

Clupea pilchardus: otoliths described and figured.

abra, *A. F. de.*

911. Catalogue systématique des vertébrés du Portugal. Poissons. Soc. Portugaise Sci. Nat., Bull., **6**, p. 57.

Clupea pilchardus: listed; synonomy; distribution.

ale, *Alvin.*

914. Preservation of commercial fish and fishery products in the tropics. Philippine Journ. Sci., **9**, no. 1, sec. D, p. 10-12. *Also in* U. S. B. F., Mem. Ser., no. 163, 2 pp.

Suggestions for methods of sardine canning; list of clupeoid fishes found in Philippines, including *Sardinella melanosticta.*

916. Sea products of Mindanao and Sulu, I: food fishes and sharks. Philippine Journ. Sci., **11**, sec. D, p. 238–239.

Suggestions for starting sardine industry.

lgwick, *Adam.*

905. A student's text-book of zoology. New York, p. 214.

Clupea pilchardus given in systematic account.

, *Henri.*

925. Études sur la pêche en Bretagne au XVIII[e] siècle. *In* Mémories et documents pour servir à l'histoire du commerce et de l'industrie en France . . . de Julien Hayem. 9. sér., p. 236–255.

History of sardine fishery in Brittany in eighteenth century, from economic standpoint.

929.1. La pêche et le commerce de la sardine en Bretagne de 1791 à 1920, d'aprés les papiers des Leguillou de Penanros. *In* Mémoires et documents pour servir à l'histoire du commerce et de l'industrie en France . . . de Julien Hayem. 12. sér., p. 233–260.

History of fishery in Brittany, taken from certain documents.

Sée, *Henri*—Continued.

1929.2. Note sur la pêche et l'industrie de la sardine en Bretagne aux XIX^e^ XX^e^ siècles. In Mémoires et documents pour servir à l'histoire du com merce et de l'industrie en France . . . de Julien Hayem. 12. sé p. 261–273.

History of sardine industry in Brittany; statistics; laws regulati fishery; fishing methods and gear.

Seilhac, *Léon de.*

1903 (?). La pêche de la sardine. *In* Encyclopédie scientifique des aide-mémoir Section du biologiste. Paris, 172 pp.

Causes of the failure; description of *Clupea pilchardus;* sardine in anti uity (Apicius' recipes); methods and gear; use of cod roe for ba process of making artificial "rogue"; social and economic conditions fishermen; methods of canning; economic conditions of cannery worke the misery of 1887—economic and social conditions; suggestions for hel ing conditions; statutes of a society of credit for sea fishermen.

1905. La question sardinière. Assoc. Franç. Avanc. Sci., Bull., fév., p. 2 *Also in* Soc. Aqui. Pêch, Bull., 1905, 17, p. 104–107.

Causes of the failure of sardine fishery; suggestions for improvemen of boats and gear.

Sekiné, *Hidesaburo,* and Akiyama, *Shiro.*

1926. On the muscle protein. III. Differences between the muscle proteins male and female fishes and different kinds of muscles of them. Jap Imp. Fish. Inst., Journ., 22, no. 1, p. 18–19. (Text in Japanese; Engli summary.)

Chemistry of muscle of *Clupea melanosticta.*

Sella, *Massimo.*

1912. Alcuni appunti sulla pesca del pesce nella Libia. Italy Com. Talass Mem., no. 18, p. 1–29.

Clupea pilchardus: season in Libya, North Africa.

Sette, *Oscar Elton.*

1920. The sardine problem in the Monterey bay district. Calif. Fish Game, no. 4, p. 181–182.

Record of what has been done in sardine investigation in California.

1925. Fishery industries of the United States, 1923. U. S. Comm. Fish., Re [for 1924] (Doc. 976), p. 144, 185.

Sardine canning; statistics of California industry.

1926.1. Sampling the California sardine: a study of the adequacy of vario system at Monterey. Calif. Fish Game Comm., Fish Bull., no. 11, p. 6 123. *Reviewed in* Pacific Fish., 1927, 25, no. 9, p. 21.

Comparison of systems of sampling to get vital statistics; weigh length studies.

1926.2. Fishery industries of the United States, 1924. U. S. Comm. Fish., Re [for 1925] (Doc. 997), p. 222, 229, 275, 282, 317, 318, 320, 321, 323, 32 326–332, 336, 350–352.

Canning sardines in Maine and California.

1927. Fishery industries of the United States, 1925. U. S. Comm. Fish., Re [for 1926] (Doc. 1010), p. 207, 208, 211, 218, 219, 222, 223, 303, 304

Sardines: statistics, east and west coasts of United States.

1928. Fishery industries in the United States, 1926. U. S. Comm. Fish., Re [for 1927] (Doc. 1025), p. 343, 347, 350, 357, 362, 365, 420, 431–43 449–463.

Sardine statistics.

1929. Fishery industries of the United States, 1927. U. S. Comm. Fish., Re [for 1928] pt. 1, (Doc. 1050), p. 502–505, 519–529.

Sardine statistics.

Shaw, *George.*

1800. General zoology or systematic natural history, . . . with plates fro the first authorities and most select specimens. London, 1800–1826, pt. 1, p. 164–165.

Clupea pilchardus: synonomy; description; compared with herring; se son of appearance in British waters.

rrin, *R. A. A.*

886. Handbook of the fishes of New Zealand. Auckland, p. 71–79.

Clupex sagax: description; distribution; methods of fishing in Cornwall and Spain; methods of preservation in Cornwall and France.

va, *A. A. Baldaque da.*

892. Estado actual das pescas em Portugal. Lisboa, p. 194–197, 225, 232.

Sardine fishing methods and gear.

monds, *Peter Lund.*

879. The commercial products of the sea. London, p. 77–80.

Clupea sardina: French methods of fishing and canning; quantities landed at different French ports.

gsberg, *Tage.*

925. Preliminary investigation of the purse seine industry of southern California. Calif. Fish Game Comm., Fish Bull., no. 9, 95 pp.

Sardine fishing methods and gear; question of destructiveness of this net. (For review, *see* Thompson, W. F., and Higgins, 1923.)

ith, *Hugh McCormick.*

895. Notes on a reconnaissance of the fisheries of the Pacific coast of the United States in 1894. U. S. Comm. Fish., Bull. [for 1894] **14**, (Doc. 293), p. 227–230.

Sardine canning at San Francisco and San Pedro; fishing methods.

896. Report of the division of statistics and methods of the fisheries. U. S. Comm. Fish., Rept. [for 1894] p. 143, 154.

Sardine canning statistics; record of sardine cannery established at San Pedro in 1893.

898. The fishes found in the vicinity of the Woods Hole region. U. S. Fish Comm., Bull. [for 1897] 17, p. 91.

Clupanodon pseudohispanicus; notes on abundance and time of appearance.

902.1. The French sardine industry. U. S. Fish Comm., Bull. [for 1901] **21**, p. 1–26, 8 pls. *Also in* Pop. Sci. Mon., 1901, **2**, p. 542–555; Fish. Gaz., **18**, p. 673–674; *part on canning quoted in* U. S. B. F., Mem. Ser., no. 50, 6 pp.; Pacific Fish., 1904, **2**, no. 9, p. 23–25.

Fishing methods and gear; spawning season; statistics; canning methods; wages of cannery employees; methods of preparation of American bait for French sardine fisheries.

902.2. Notes on the subtropical fishes observed in 1900. *In* Biological notes, no. 2., U. S. B. F., Bull. [for 1901] **21**, p. 32.

Sardina pseudohispanicus recorded from Woods Hole.

904. Brittany, the land of the sardine. St. Nicholas Mag., **31**, no. 11, p. 963–968, figs.

Fishing methods and gear; methods of canning.

905. The sardine. Pacific Fish., **3**, no. 1, p. 12, 15.

European sardine: description; distribution; fluctuations in fishery; different sizes taken off English coast and in Mediterranean.

909. Brittany: the land of the sardine. Nat. Geogr. Mag., **20**, no. 6, p. 541–573, figs.

Popular article describing sardine fishing methods, complicated division of earnings of fishermen; methods of canning.

ith, *W. Anderson.*

883.1. The fish supply of great cities with special reference to the best methods of catching and packing, and of distribution . . . *In* Fish and fisheries. A selection from the prize essays of the international fisheries exhibition, Edinburgh, 1882. Edited by David Herbert. Edinburgh, p. 228.

Methods of catching Cornish pilchards.

Smith, *W. Anderson*—Continued.

1883.2. Curing and preserving fish at home and abroad. *In* Fish and fisheries. A selection from the prize essays of the International fisheries exhibition, Edinburgh, 1882. Edited by David Herbert. Edinburgh, p. 100.

Canning of sardines in Cornwall and France.

1892. Report on Spanish sardines. Scotland Fish. Bd., 10. Ann. Rept. [for 1891] p. 160–170.

Review of work of Pouchet and Marion on sardine as to identity of pilchard and sardine; spawning habits; migrations; fishing methods and gear in Spain; methods of preservation.

Smitt, *Frederik Adam, editor.*

1893. A history of Scandinavian fishes by B. Fries, C. W. Ekström and C. Sundevall. Second edition revised and completed by F. A. Smitt. Stockholm, 2, p. 979–983.

Clupea pilchardus: synonomy; description; figured; distribution; food; migrations; spawning; enemies.

Société d'Océanographie de France.

1922. L'industrie sardinière en Californie. Soc. Océanogr. France, Bull., 2, no. 7, p. 216–217.

Review of California Fish and Game, 1921, 7, no. 4, sardine number.

Society of Arts.

1882. Sardine fishery. Soc. Arts, Journ., 30, p. 398.

Fishing and preserving methods in France.

Soldatov, *V. K.*, and Lindberg, *G. J.*

1930. A review of the fishes of the seas of the far east. Pacific Sci. Fish. Inst., Bull., 5, p. 38–39. [In Russian.]

Sardinella melanosticta: synonmy; description.

Spain. Instituto Español de Oceanografía.

1916. Sección de estadística. Bol. Pescas, 1, no. 1–2, 18 pp.

Sardine statistics of Spain for 1915.

1920.1. Memoria correspondiente al año 1919, publicada por el comité de la asociación general de industrias pesqueras y sus derivadas. Bol. Pescas, 5, no. 46–47, p. 218–219.

Sardine fishery on coast of Portugal.

1920.2. Preparación de las sardinas en Stavanger. Bol. Pescas, 5, no. 48–52, p. 371.

Short description of Norwegian methods of canning sprats as sardines.

1920.3. Un curioso fallo contra las sardinas falsas. Bol. Pescas, 5, no. 48–52, p. 371.

Controversy over true and false sardines.

1926.1. Las conservas de sardina en Francia. Bol Pescas, 11, no. 113, p. 21.

Sardine industry in France.

1926.2. La importación y exportación de conservas de sardinas en Francia. Bol Pescas, 11, no. 123, p. 316.

Importations and exportations of sardines in France.

1929. La floreciente industria sardinera en California. Bol. Pescas, 14, no. 15[illegible] p. 219–223.

Description and illustrations of California sardine industry.

Spain. Anuario estadístico de la marina mercante y del la pesca marítima, 1914

1915. Madrid.

Statistics.

Spain. Ministerio de Fomento.

1929. Estadística de la pesca marítima en España (año 1928). Spain Inst Español Oceanogr., Not. Res., ser. 2, no. 34, p. 21, 59–68.

Sardine statistics of Spain.

ahmer, *Max.*

1913. Fischhandel und Fischindustrie. Stuttgart, p. 306–311.

Clupea pilchardus: methods of canning in France, Spain, Portugal; Norwegian methods of canning sprats as sardines.

arks, *Edwin Chapin.*

1911. Results of an ichthyological survey about the San Juan islands, Washington. Carnegie Mus., Ann., **7**, no. 2, p. 207.

Clupanodon caeruleus listed from Puget Sound.

1913. Fishes from Brazil collected by the Stanford expedition of 1911. Stanford Univ. Publ., Univ. Ser., no. 12, p. 8.

Sardinella sardina described.

1918. The herrings and herring-like fishes of California. Calif. Fish Game, **4**, no. 2, p. 61–62.

Sardinia caerulea: description; methods of canning in California.

1926. Bones of the ethmoid region of the fish skull. Stanford Univ. Publ., Univ. Ser., Biol. Sci., **4**, no. 3, p. 148.

Sardinia caeruleus: anatomy of skull.

arks, *Edwin Chapin*, and Morris, *Earl Leonard.*

1907. The marine fishes of southern California. Univ. Calif. Publ. Zool., **3**, no. 7, p. 177.

Sardinella caeruleus: description; distribution.

ead, *David G.*

1906. Fishes of Australia. A popular and systematic guide to the study of the wealth within our waters. Sydney, p. 28–29.

Clupanodon neopilchardus: abundance in Australian waters; distribution.

1908. The edible fishes of New South Wales. Sydney, p. 25–26, pl. 4.

Clupanodon neopilchardus: coloration; abundance in Australian waters.

teindachner, *Franz.*

1865. Ichthyologischer Bericht über nach Spanien und Portugal internomene Reise. Akad. Wiss. Wien, Sitzber., 1. abt., Apr. heft, p. 72.

Alausa pilchardus: distribution.

1879. Ueber einige neue und seltene Fisch-Arten aus den k. k. Zoologischen Museen zu Wien, Stuttgart and Warschau. Akad. Wiss. Wien, Denkschr., **41**, p. 12–13.

Clupea neopilchardus: description.

1898. Die Fische der Sammlung Plate. *In* Fauna Chilensis. Abhandlungen zur Kenntniss der Zoologie Chilies nach den Sammlungen von Dr. L. Plate. **1**, 2. heft, p. 331.

Clupea sajax listed from Chile.

teuer, *Adolf.*

1908. Materialien zu einer Naturgeschichte der adriatischen Sardine. Oesterr. Fisch. Zeit., **5**, p. 206–208, 226–228, 278–279, 422–423, 438–439.

Clupea pilchardus: detailed discussion of synonomy, classification, morphology, and anatomy, including otoliths and scales (both figured); parasites (good discussion), 16 listed; food; spawning; eggs and larvae described and figured; history of sardine industry in Europe.

tevenson, *Charles Hugh.*

1899. The preservation of fishery products for food. U. S. Comm. Fish., Bull. [for 1898] **18**, (Doc. 487), p. 465–466, 467–468, 526–537.

Salted, pickled and canned sardines.

torrow, *B.*

1915. The age and growth of the pilchard. Dove Mar. Lab., Rept., n. s. no. 4, p. 54–56, 3 pls.

Scale readings for age.

Sumner, *Francis,* **Osburn,** *Raymond C.,* and **Cole,** *Leon J.*

1913. A catalogue of the marine fauna. *In* A biological survey of the waters of Woods Hole and vicinity. U. S. B. F., Bull. [for 1911] **31,** pt. 2, p. 741.

Clupanodon pseudohispanicus: parasites; food.

Suzuki, *U.,* and **Mihata,** *M.*

1912. Über die Extraktivstoffe des Fischfleisches und der Muscheln. Tokyo Coll. Agric., Journ., **5,** no. 1, p. 1–5.

Chemical analysis of sardines.

Swainson, *William.*

1838. The natural history and classification of fishes, amphibians, and reptiles. *In* The cabinet cyclopaedia, by Dionysus Lardner. London, 1838–1839, 1, p. 271–275.

English methods of fishing and gear.

Swan, *James G.*

1894. Notes on the fisheries and the fishery industries of Puget Sound. U. S. Fish Comm., Bull. [for 1893] **13,** p. 377.

Methods of fishing sardines; recommendations for starting sardine canning industry in state of Washington.

Swithinbank, *Harold,* and **Bullen,** *G. E.*

1913. The scientific and economic aspects of the Cornish pilchard fishery. I. The food and feeding habits of the pilchard in coastal waters. Mera Publications, St. Albans, no. 1, 27 pp.

Food and feeding habits.

1914. The scientific and economic aspects of the Cornish pilchard fishery. II. The plankton of the inshore waters in 1913 considered in relation to the fishery. Mera Publications, St. Albans, no. 2, 32 pp.

Plankton studied in relation to pilchard fishery.

Syndicat National des Fabricants Français de Conserves de Sardines et autres Poissons.

____. Statuts. Nantes (no date), 8 pp.

Rules for French sardine canners' association.

T

Taylor, *Harden F.*

1924. Fishery industries of the United States. U. S. Comm. Fish., Rept. [for 1923] p. 7–8, 14, 18–20.

Sardine canning in California; statistics of Maine and California.

1926. Mineral constituents of fish and shellfish. *In* Nutritive value of fish and shellfish, *compiled by* Harry R. Beard. U. S. Comm. Fish., Rept. [for 1925] (Doc. 1000), p. 544.

Chemical composition of California and Maine sardines.

Temminck, *Coenraad Jacob,* and **Schlegel,** *Herman.*

1850. Pisces. *In* Fauna Japonica, sive descriptio animalium quae in itinere per Japonicam suscepto annis 1823–1830 collegit, etc., *by* Ph. Fr. von Siebold. Lugduni Batavorum, p. 237, pl. 107, fig. 3.

Clupea melanosticta: description; colored plate.

Tendick, *Carl B.*

1931. The value of the commercial catch of fishery products in California. *In* The commercial fish catch of California for the year 1929. Calif. Div. Fish Game, Fish Bull., no. 30, p. 19.

Comparison of value of catch of sardines.

Tenison-Woods, *Julian Edmund.*

1882. Fish and fisheries of New South Wales. Sydney, p. 86.

Clupea sagax: season of appearance; abundance.

rry, *John B.*

1929. Monterey retains distinction of being world's leading sardine port. Calif. Fish., 1, no. 6, p. 7–8.

Sardine season described; statistics, 1920–1928.

élohan, *P.*

1890.1. Sur deux coccidies de la sardine. Journ. Anat. Physiol., Paris, 26, p. 237–238.

Two species of *Coccidium* parasitic on sardine.

1890.2. Sur deux coccidies nouvelles parasites de l'épinoche et de la sardine. Acad. Sci. Paris, C. R., p. 1214–1216. *Also in* Soc. Biol. Paris, C. R., 1890, p. 347–348; *and in* Ann. Micrographie, 1890, 2, no. 10, 1 pl.

Parasites.

omas, *Arthur.*

1926. Nutzbringende Verwertung der in der Sardinenindustrie enstehenden Abfälle. Fischwirtschaft, 2, heft 5–6, p. 92–95.

Nutritional value of sardines; chemical analysis.

ompson, *Ruth Miller.*

1927. California sardine investigations. Being a review of fish bulletin no. 11, "The California sardine." Calif. Fish Game, 13, no. 2, p. 143–145.

Review of Calif. Fish Game Comm., Fish Bull., 1926, no. 11.

ompson, *William.*

1856. The natural history of Ireland. London, 4, p. 177.

Clupea pilchardus: localities noted.

ompson, *William Francis.*

1919. Notes from the state fisheries laboratory. Calif. Fish Game, 5, no. 3, p. 159.

Investigations on the breeding season of the sardine of southern California.

1920.1. The proposed investigation of the sardine. Calif. Fish Game, 6, no. 1, p. 10–12.

Outline of questions to be answered in investigation of California sardine.

1920.2. Progress of the sardine work. Calif. Fish Game, 6, no. 2, p. 83.

Sardine investigations in southern California.

1921.1. The future of the sardine. Calif. Fish Game, 7, no. 1, p. 38–41.

Present investigations on California sardine with purpose of predicting future of fishery.

1921.2. Notes from the state fisheries laboratory. Calif. Fish Game, 7, no. 1, p. 59–60.

Sardine season; conferences on sardine work in southern California.

1921.3. Quarter-oils or half-pound ovals. Calif. Fish Game, 7, no. 2, p. 106–110.

Discussion of effect of year classes, migrations, and physical conditions on size of fish in commercial catch.

1921.4. Whales and sardines. Calif. Fish Game, 7, no. 2, p. 110–111.

Criticism of theories relating to abundance of sardines.

1921.5. The sardine of California. Calif. Fish Game, 7, no. 4, p. 193–194.

Sardina caerulea of California, *S. pilchardus pilchardus* of Atlantic, *S. pilchardus sardina* of Mediterranean, *S. sajax* of Peru, *S. melanosticta* of Japan, *S. neopilchardus* of Australia, *S. ocellata* of Cape of Good Hope, are the true sardines of the world.

1921.6. Historical review of California sardine industry. Calif. Fish Game, 7, no. 4, p. 195–206.

History of fishing and canning methods; by-products.

1922. The fisheries of California and their care. Calif. Fish Game, 8, p. 176–177.

Sardine fishery of California from 1879 to 1920 (number of pounds only).

Thompson, *William Francis*—Continued.

1923. The use of fish as fertilizer. Calif. Fish Game, **9**, no. 2, p. 74.

Reduction of sardines to fertilizer; discussion of question as a matter of conservation.

1924. Report of the state fisheries laboratory. Calif. Fish Game Comm., 28. Bienn. Rept. [for 1922–1924] p. 58–64, 69.

Program and methods of sardine investigation.

1926.1. The California sardine and the study of the available supply. Calif. Div. Fish Game, Fish Bull., no. 11, p. 4–66. *Reviewed in* Pacific Fish., 1927. **25**, no. 9, p. 20.

Sardina caerulea compared with *Clupea pilchardus* in color, scales (figured), gill rakers, body and head proportions, vertebral counts, gill raker counts, local races; distribution of sardines on American Pacific coast, according to amount used; statistics; weight studies; season of fishery; amounts of pack; fishing methods and gear; causes of fluctuations in catch of European sardine; French fishing methods and gear; migrations related to food; effect of temperature on spawning; detailed discussion relating to analysis of the commercial catch; description of available material and method of sampling; age analysis; outline of methods of investigation on length, sex and sexual maturity and other data mentioned; literature cited.

1926.2. Errors in the method of sampling used in the study of the California sardine. Calif. Fish Game Comm., Fish Bull., no. 11, p. 159–189. *Reviewed in* Pacific Fish., 1927, **25**, no. 9, p. 21.

Critical study of statistical methods used; length studies; growth rate.

Thompson, *William Francis*, and **Edser,** *T.*

1929. Correspondence. [California sardine investigations.] Cons. Explor. Mer. Journ., **4**, no. 2, p. 226–229.

Controversy over work of Clark, F. N., 1928, and Andrews, C. B., 1928.

Thompson, *William Francis*, and **Higgins,** *Elmer.*

1920. Notes from the state fisheries laboratory. Calif. Fish Game, **6**, no. 1, p. 32.

Scientific research started on California sardine.

1923. Review of Dr. Skogsberg's report on the purse seine fisheries of California. Calif. Fish Game, **9**, p. 87–98.

Review of Skogsberg, T., 1925; sardine fishing methods and gear; question of destructiveness of this net.

Thomson, *George Malcolm.*

1892. Notes on sea-fishes. New Zealand Inst., Trans. [for 1891] **24**, p. 213.

Clupea sajax found in enormous quantities in New Zealand.

Thomson, *J. Allan.*

1918. Is a sardine industry practicable in New Zealand? New Zealand Journ. Sci. Tech., **1**, p. 7–8.

Clupea sajax: abundance suggesting possibility of industry.

Thoulet, *J.*

1913. À propos de la crise sardinière. Bull. Trim. Pêch. Marit., **18**, no. 4, p. 837–856.

Theories to account for disappearance of sardines; discussion of bearing of oceanography and international cooperation on problem.

Tressler, *Donald Kiteley.*

1923. Marine products of commerce. New York, p. 389–397, 405, 430–435, 462, 725, 735.

Description of sardine canning methods of Maine, California, Norway and France; chemistry of fish; preparation of herring as Russian sardines; methods of manufacture of oil and meal; characteristics of oil, American and European; chemical composition of scrap; statistics of canned fish (east and west coast of United States).

Tressler, *Donald Kiteley*, and **Wells,** *Arthur W.*

1925. Iodine content of sea foods. U. S. Fish. Comm., Rept. [for 1924] Append. I, p. 4, 6.

Alosa sardina: chemistry.

Trévédy, *J.*

1888. La pêche de la sardine en Bretagne au dernier siècle. Assoc. Bretonne, Bull. Archéol., 3. sér., **8**, p. 117–139.

History of sardine fishery of Brittany in the 1700's and 1800's.

Tsuda, *Noritake.*

1917. Exorcism and sardine heads. Open Court, **31**, p. 563–569, 3 figs.

Sardine heads used in Japan to cast out demons.

Turton, *William.*

1807. The British fauna, containing a compendium of the zoology of the British islands; arranged according to the Linnean system. Swansea & London, p. 106.

Clupea pilchardus: coloration; description.

U

Ulrey, *Albert B.* and Greely, *Paul O.*

1928. A list of the marine fishes (Teleostei) of southern California with their distribution. S. Calif. Acad. Sci., Bull., **27**, pt. 1, p. 10.

Sardinia caeruleus: synonomy.

United States Department of Commerce. Fisheries Service Bulletin.

1921. Sardine industry of Maine in 1919 and 1920. U. S. D. C., Fish. Serv. Bull., no. 71, p. 3.

Conditions of industry.

1922.1. Technological investigations at San Pedro. U. S. D. C., Fish. Serv. Bull., no. 80, p. 5.

Experiments in sardine canning methods at San Pedro, California.

1922.2. Investigation on methods of cooking sardines. U. S. D. C., Fish Serv. Bull., no. 82, p. 4.

Experiments in canning methods at San Pedro, California.

1929. Act regulating the packing of sardines in Maine. U. S. D. C., Fish. Serv. Bull., no. 169, p. 6–7.

Act to regulate the quality of sardine pack.

United States Department of Commerce. Foodstuffs 'Round the World. Fishery News.

1925+.

In nearly every number beginning with 1925 are notes on sardine fisheries, industry and market conditions of the world.

United States Department of Commerce. Fishery Science and Trade.

1930. Sardine industry in Norway. U. S. D. C., Fish. Sci. Trade, **2**, no. 1, p. 4.

Statistics and condition of industry.

United States Fisheries Association.

1927. Fish and sea food recipes. New York, p. 51–53.

Recipes for preparing canned sardines.

United States Tariff Commission.

1925. Tariff information surveys on articles in paragraph 720 of the tariff act of 1922. Sardines. Washington. *Reviewed in* Pacific Fish., 1925, **23**, no. 4, p. 52.

Sardina caerulea: California methods and amount of production; history of industry; foreign production; imports, exports of United States; prices of all countries compared; history of tariff.

1931. Report to the United States senate on fish and other marine products. Report no. 17, second series, Washington, p. 9, 12.

Statistics of sardine catch in California, 1929, according to alien-owned and citizen-owned vessels.

V

Vachez, *A.*

1913.1. L'industrie espagnole des conserves de sardines et la crise sardinière en France. Bull. Trim. Pêch. Marit., **18,** no. 2, p. 391–405.

Economic conditions of Spanish sardine industry affecting French crisis; Spanish regulations for the sale, preparation and packng of sardines.

1913.2. Industrie des conserves de sardines. La question du "sprat". Apparition de la sardine à Vigo. Bull. Trim. Pêch. Marit., **18,** no. 2, p. 405–408.

Protest aganst labeling sprats as sardines; amount and value of sardines landed (March, 1913) at the Spanish port of Vigo.

1913.3. Activité de l'industrie sardinière à Vigo. pendant la campagne 1912. Bull. Trim. Pêch. Marit., **18,** no. 3, p. 656–660.

Statistics of exportations from Vigo, Spain; conditions in Spanish sardine industry.

Vaillant, *Léon,* and Henneguy, *F.*

1888. Habitat et moeurs de la sardine. Nourriture . . . Reproduction . . . Causes de la disparition de la sardine. Revue Marit. Colon., **97,** p. 544–554. *Also in* Journ. Off., 1887, **19,** no. 283, p. 4599; no. 284, p. 4614–4615.

Alosa pilchardus: habitat; temperature affecting migrations; food; reproduction; causes of disappearance.

Vauvert, *Maxime.*

1870. La pêche de la sardine. La Monde Illustré, Paris, p. 374.

French sardine fishery (short article).

Verriere, _____.

1924. Les essais de congélation de poisson au frigorifique de Lorient. Bull. Trim. Pêch. Marit., **29,** no. 4. p. 25–27, 30.

Experiments in refrigeration of sardines.

Vienkoff, _____.

1893. La pêche de la sardine d'Esthonie à Réval et au Port-Baltique. Soc. Nat. Acclimat., Bull., **12,** p. 71–73.

Sardine fishery of Esthonia; amounts canned.

Vignols, *Léon,* and Sée, *Henri.*

1926. Correspondance d'un marchand de sardines de Concarneau (1722–1730). *In* Mémoires et documents . . . de Julien Hayem. 10 sér., p. 159–164.

History of sardine fishery, Concarneau, 1722–1730.

Vinciguerra, *Decio.*

1893. Catalogo dei pesci delle isole Canarie. Soc. Ital. Sci. Nat., Atti, **34,** fasc. 3, p. 331.

Clupea pilchardus listed.

Von Fellenberg, *Th.*

1923. Untersuchungen über das Vorkommen von Jod in der Natur. Switzerland Lebensm. Hyg., Mitt., **14,** p. 233.

Iodine content of sardine.

Von Zittel, *Karl A.*

1902. Text-book of palaeontology. Translated and edited by Charles R. Eastman. London, p. 96.

Meletta sardinites figured; *Meletta* genus described; horizons and localities given.

Vukotinović, *Ljud von.*

1870. O petrefaktih (okaminah) u obće, i o podzemskoj fauni i flori Susedskih laporah. Jugoslav. Akad., Rad, **13,** p. 208.

Meletta sardinites, var. *heterostoma:* description of fossils.

W

Waite, *Edgar Ravenswood.*

1899. Scientific results of the trawling expedition of H. M. C. S. "Thetis." Fishes. Australian Mus., Mem., **4**, p. 53.
Clupanodon neopilchardus listed.

1904. A synopsis of the fishes of New South Wales. New S. Wales Nat. Club., Mem., no. 2, p. 13.
Clupanodon neopilchardus listed.

1905. Notes on fishes from western Australia. Australian Mus., Rec., 1905–1907, **6**, no. 2, p. 58.
Clupanodon neopilchardus listed.

1907. A basic list of the fishes of New Zealand. Canterbury Mus., Rec., **1**, no. 1, p. 10.
Clupea sagax listed.

1911. Scientific results of the New Zealand government trawling expedition, 1907. Pisces. Canterbury Mus., Rec., **1**, no. 3, p. 158–159.
Clupea neopilchardus: description.

1916. Fishes. Australian Antarctic Expedition, 1911–1914, **3**, pt. 1, p. 56, 81.
Amblygaster neopilchardus, from Carnley Harbor: nomenclature.

1923. The fishes of South Australia. Adelaide, p. 58.
Sardinia neopilcharda: description; enormous abundance.

Walbaum, *Iohanne Iulio.*

1792. Petri Artedi sueci genera piscium . . . Emendata et aucta a Iohanne Iulio Walbaum. Grypeswaldiae, **3**, p. 38.
Clupea pilchardus: description; synonomy.

Walford, *Lionel Albert.*

1931.1. Handbook of common commercial and game fishes of California. Calif. Div. Fish Game, Fish Bull., no. 28, p. 47, 1 fig.
Sardina caerulea: description; distribution; fishing season in California; fishing methods and gear; key.

1931.2. Common and scientific names of fishes, crustaceans and mollusks. *In* The commercial fish catch of California for the year 1929. Calif. Div. Fish Game, Fish Bull., no. 30, p. 7.
Sardine—*Sardina caerulea.*

Walker, *George.*

1885. The fisheries of France in 1880, '81 and '82. U. S. Comm. Fish., Rept. [for 1883] p. 1189.
Statistics of sardine fishery.

Walpole, *Spencer.*

1883. The British fish trade. Intern. Fish. Exhib. Lit., **1**, p. 21–22.
Pilchard curing methods.

Weaver, *James Riley.*

1885. The fisheries of Austro-Hungary from 1877 to 1883. U. S. Comm. Fish., Rept. [for 1883] p. 1198.
Statistics of sardine fishery.

Webb, *U. S.*, **Harrison,** *Robert W.*, **and Greene,** *B. D. Marx.*

1924. Appellant's opening brief. The people of the state of California, plaintiff and appellant, vs. Monterey fish products company (a corporation), defendant and respondent. S. F. no. 11,376. In the Supreme Court of the State of California. Sacramento, 25 pp.
Litigation over reduction of sardines to fertilizer.

Weber, *F. C.*

1921. The Maine sardine industry. U. S. D. A., Bull., no. 908, 127 pp.
Canning of young herring as sardines; food value; canning methods; experimental work; standardization of pack; use of waste; bibliography.

Weber, *F. C.*, and Wilson, *J. B.*

1919. The formation of ammonia and amines in canned sardines during storage. Indus. Eng. Chem., 11, p. 121–132.

Experiments and details of chemical changes in canned sardines.

Wells, *Arthur W.*

1925. Iodine content of preserved sea foods. U. S. Comm. Fish., Rept. [for 1924] (Doc. 979), p. 442–443.

Chemistry of California and Maine sardines.

West, *Samuel.*

1893. Poisoning from sardines. St. Bartholomew's Hosp. Journ., 1, p. 9.

Description of case of poisoning from sardines.

West Coast Fisheries.

1929.1. Compromise on sardine legislation. Canned fish products of California for the year 1928. West Coast Fish., June, p. 22.

Decision with regard to canning of sardines (amount allowed for reduction to fertilizer); statistics.

1929.2. Sardine eggs, larvae found off Point Vincent. West Coast Fish., July, p. 21.

Record of discovery in southern California waters by E. C. Scofield. (*See* Scofield, E. C., and Lindner, M. J., 1930.)

1929.3. Oceanographers seek facts about the sardine. Life history of the pilchard being worked on; scientists find eggs. West Coast Fish., Aug., p. 13, 18.

History of research on the California sardine; finding of eggs.

1929.4. Sardine disposition. Cannery fish flour, meal and oil production for 1928–29. West Coast Fish., Sept., p. 22.

California statistics taken from California Bureau of Commercial Fisheries records.

1929.5. Sardine, tuna, mackerel packers busy during September. West Coast Fish., Oct., p. 8.

Sardine season in California.

1929.6. Sardine packing begins in southern California; tuna proceeds. West Coast Fish., Oct., p. 14, 19.

Condition of fishery.

1929.7. Is the map of the sardine packing world due for a change? West Coast Fish., Oct., p. 14–16.

Starting of cannery in Santa Barbara in order to be nearer sardine fishing grounds.

1929.8. Monterey sardine products co. opens $200,000 plant. West Coast Fish., Oct., p. 29–33.

Description and illustrations of equipment of new plant at Monterey, California.

1929.9. Sardine exports. Movement of fish in and out of Los Angeles shown. West Coast Fish., Nov., p. 44.

Statistics taken from Annual Report of Los Angeles Harbor Department.

1929.10. Sardine chiller installed by Van Camp company. West Coast Fish., Dec., p. 18.

Description of apparatus for chilling sardines.

1930.1. Sardine packers of California. A guide to the canned fish trade giving location of plants, officers, principal brands and fish packed. West Coast Fish., New Year's No., p. 41.

Directory.

1930.2. Canning of the true sardine in California. West Coast Fish., New Year's No., p. 42–46.

Fishing methods and gear; history of industry.

1930.3. New sardine exhausting. West Coast Fish., New Year's No., p. 73.

Tabulation of costs of "drying and frying" and "raw pack."

Vest Coast Fisheries—Continued.

1930.4. The California state fisheries laboratory. West Coast Fish., New Year's No., p. 93, 94.

Sardine investigations carried out, and in progress.

1930.5. Sardines. Their range and season in domestic and contiguous waters. West Coast Fish., Feb., p. 8–12, FFV, sec. 17.

Distribution; season; fishing methods and gear; fishing areas; relation of fatness to temperature of water.

1930.6. Sardine canners association of California. West Coast Fish., April, p. 31–32.

Record of organizing association.

1930.7. The sardine is acquitted. West Coast Fish., May, p. 9, 17.

California sardine in Cuban and Belgian markets; tariff rates of two latter countries.

1930.8. Sardine canners association to expand operations. West Coast Fish., May, p. 11.

Enlargement of California organization to include all canners.

1930.9. California sardines. West Coast Fish., July, p. 70.

In each issue during the season, starting with this number, is a page devoted to cannery, markets and fishing conditions.

1931.1. A successful sardine light buoy. West Coast Fish., March, p. 29.

Description of light buoy for sardine nets.

1931.2. Inventing the sardine griller. Merchandising a delicacy. Steam grilling the blue sardine. West Coast Fish., Aug., p. 21–25.

New canning process described.

Vestern Canner and Packer.

1930. P. C. sardines in world markets. West Can. Pack., **22**, no. 6, p. 21–22.

Oriental market most important.

Wewers, *H.*

1930. Sardines in oil. Zeitschr. Ang. Chemie, **43**, July 19, p. 656. *Abstract in* Food Indus., 1930, **2**, no. 9, p. 416.

Sardine oil mixed with olive oil after packing raised iodine content and brought suspicion of adulteraton.

Weymouth, *Frank Walter.*

1910. Notes on a collection of fishes from Cameron, Louisiana. U. S. Nat. Mus., Proc., **38**, p. 136.

Clupanodon pseudohispanicus from Cameron, Louisiana: one specimen taken.

Wheeler, *H. E.*

1917. Question of priority for round can sardines. Pacific Fish., **15**, no. 7, p. 21.

Article in Pacific Fish., 1917, **15**, no. 6, p. 26, on originator of round can, contradicted.

White, *Adam.*

1851. List of the specimens of British animals in the collection of the British museum. Fish. London, pt. 8, p. 83.

Clupea pilchardus: synonomy.

Whitehead, *Seward Samuel.*

1927. Keeping small sardines firm by refrigeration. Calif. Fish Game, **13**, no. 3, p. 217.

Description of refrigeration apparatus.

1929. Commercial species—quantities and values in order of importance. *In* The commercial fish catch of California for the years 1926–1927. Calif. Div. Fish Game, Fish Bull., no. 15, p. 14, 15, 16, 17.

Sardine statistics; arrays showing relative importance with 29 other California species.

Wilcocks, *J. C.*

1865. The sea-fisherman or fishing pilotage. Guernsey, p. 151–153.

Description and use of pilchard seine (England).

1883. The history and statistics of the pilchard fishery in England. *In* Fis and fisheries. A selection from the prize essays of the international fis eries exhibition, Edinburgh. Edited by David Herbert. Edinburgh, 290–303.

Pilchard: distribution; spawning; food; fishing methods and gear; heraldry; methods of preservation; laws regulating fishery; statistics.

Wilcox, *William A.*

1898. Notes on the fisheries of the Pacific coast in 1895. U. S. Comm. Fish Rept. [for 1896] p. 633, 650–657, 659.

Statistics of sardine fishery in California, including amounts lande according to gear used.

1902. Notes on the fisheries of the Pacific coast in 1899. U. S. Comm. Fish Rept. [for 1901] p. 511, 550, 553, 554, 555, 556, 557, 560, 562, 564, 57

Statistics of California.

1907. The commercial fisheries of the Pacific coast states in 1904. U. S. Comm Fish., Rept. [for 1905] (Doc. 612), p. 7, 15, 27–29, 60–72.

Sardine canning industry; statistics of California.

Willughby, *Francis.*

1685. Historia piscium. Londini, p. 223–224, tab. P. 1, fig. 1.

Pilchard: description; anatomy; method of fishing in England; sma pilchard (the fish of the Mediterranean) described and figured.

Wilson, *James.*

1907. Labeling of sardines. U. S. D. A., Bur. Chem., Food Inspection Decisio no. 64, 1 p.

Regulations governing labeling.

Winther, *Georg Peter.*

1879. Prodromus ichthyologiae danicae marinae. Fortegnelse over de i de dansk farvande hidtil fundne fiske. Naturhist. Tidsskr., 1879–80, 12, p. 49.

Clupea pilchardus: synonomy; description.

Woodward, *Arthur Smith.*

1901. Catalogue of fossil fishes in the British museum (natural history). Londo pt. 4, p. 152.

Clupea sardinites: synonomy; description of fossils from Lower Oligo cene, Croatia.

Wright, *Sidney.*

1922. The romance of the world's fisheries. London, p. 156–164.

Pilchard fishing methods and gear of Cornwall, England; Cornis methods of preservation.

Ws_____, _____.

1921. Sardinerfang und industrie in Frankreich. Fischerbote, no. 23, p. 965.

Sardine fishing and industrial conditions in France.

Y

Yarrell, *William.*

1836. A history of British fishes. London, 2, p. 96–109.

Clupea pilchardus: synonomy; food; Cornwall fishing methods.

Young, *Maxwell,* and **Thomson,** *George M.*

1926. Occurrence of pilchards and sprats in New Zealand seas. New Zealan Inst., Trans., 57, p. 314–319.

Sardinia neopilchardus: full synonomy for New Zealand; distributio

Z

Zietz, *A.*

1908. A synopsis of the fishes of South Australia. R. Soc. S. Australia, Trans 32, p. 294.

Clupea sajax: distribution.

LIST OF ABBREVIATIONS USED FOR PERIODICALS CITED

A

Aarsb. Norges Fisk.—Aarsberetning Vedkommende Norges Fiskerier. Bergen.
Acad. Nat. Sci. Philadelphia.—Academy of Natural Sciences of Philadelphia.
Proc.—Proceedings.
Acad. Roumaine.—Académie Roumaine. Bucharest.
Bull. Sec. Sci.—Bulletin de la Section Scientifique.
Acad. Sci. Lisboa.—Academia Real das Sciencias de Lisboa. Lisboa.
Jorn.—Jornal das Sciencias Mathematicas, Physicas, e Naturaes.
Acad. Sci. Paris.—Académie des Sciences. Paris.
C. R.—Compte Rendu.
Mém.—Mémoires.
Akad. Wiss. Wien.—Kaiserlichen Akademie der Wissenschaften Wien. Mathematisch-naturwissenschaftliche Klasse.
Anz.—Anzeiger.
Denkschr.—Denkschriften.
Sitzber.—Sitzungsberichte
American Fish Culturist.—St. Johnsburg, Vermont.
American Fish Soc.—American Fisheries Society.
Trans.—Transactions.
American Journ. Pub. Health.—American Journal of Public Health. American Public Health Association. Boston.
American Nat.—American Naturalist. Boston.
Ann. Fals.—Annales des Falsifications. Paris.
Ann. Mag. Nat. Hist.—Annals and Magazine of Natural History. London.
Ann. Micrographie.—Annales de Micrographie. Paris.
Ann. Sci. Nat.—Annales des Sciences Naturelles. Paris.
Zool.—Zoologie.
Ann. Sci. Nat. Oporto.—Annaes de Sciencias Naturaes. Oporto.
Arch. Méd. Navale.—Archives de Médicine Navale et Coloniale. France. Ministère de la Marine. Paris.
Arch. Pharm.—Archives de Pharmacie. Paris.
Arch. Sci. Phys. Nat.—Archives des Sciences Physiques et Naturelles. Genève.
Arch. Zool. Exp.—Archives de Zoologie Expérimentale et Générale. Paris.
Assoc. Bretonne.—Association Bretonne. Saint-Brieuc.
Bull. Archéol.—Bulletin Archéologie.
Assoc. Franç. Avanc. Sci.—Association Française pour l'Avâncement des Sciences. Paris.
Bull.—Bulletin.
C. R.—Compte Rendu de la Session.
Atco Fish. News.—Atco Fisheries News. New York.
Australian Mus.—Australian Museum. Sydney.
Mem.—Memoirs.
Rec.—Records.

B

Batav. Genoot. Kunst. Wetens.—Bataviaasch Genootschap van Kunsten en Wetenschappen. Batavia.
Verh.—Verhandelingen.
Beitr. Paläont. Oesterreich-Ungarn.—Beitrage zur Paläontologie und Geologie Oesterreich-Ungarn's und des Orients. Wien.
Berwickshire Nat. Club.—Berwickshire Naturalists Club. Alnwick.
Proc.—Proceedings and History.
Biol. Abst.—Biological Abstracts. Philadelphia.
Bingham Oceanogr. Coll.—Bingham Oceanographical Collection. New Haven, Connecticut.
Bull.—Bulletin.
Bishop Mus.—Bernice Pauahi Bishop Museum of Polynesian Ethnology and Natural History. Honolulu.
Mem.—Memoirs.

Bol. Pescas.—*See* **Spain Inst. Español Oceanogr.**
Boletin Bosques, Pesca i Caza.—Santiago.
Boll. Pesca Piscicolt. Idrobiol.—Bollettino di Pesca, Piscicoltura e di Idrobiologia. Italy. Ministero dell'Economia Nazionale. Roma.
Boston Soc. Nat. Hist.—Boston Society of Natural History.
Occ. Pap.—Occasional Papers.
Brit. Assoc. Adv. Sci.—British Association for the Advancement of Science. London.
Rept.—Report.
Brit. Med. Journ.—British Medical Journal. London.
Bull. Mar. March.—Bulletin Générale de la Marine Marchande. Paris.
Bull. Trim. Pêch. Marit.—Bulletin Trimestriel de l'Enseignement Professionnel et Technique des Pêches Maritimes. Paris.

C

Calif. Acad. Sci.—California Academy of Sciences. San Francisco.
Proc.—Proceedings.
Calif. Comm. Fish.—California Commissioners of Fisheries. Sacramento.
Rept.—Report.
Calif. Div. Fish Game.—California Division of Fish and Game. Sacramento.
Bienn. Rept.—Biennial Report.
Calif. Fish Game.—California Fish and Game.
Circ.—Circular.
Fish Bull.—Fish Bulletin.
Calif. Fish.—California Fisheries. San Pedro, California. *Continued as* West Coast Fisheries.
Calif. Fish Game.—*See* **Calif. Div. Fish Game.**
Calif. Fish Game Comm.—California Fish and Game Commission. Sacramento. *See* **Calif. Div. Fish Game,** to which title was changed in 1927.
Canada Dept. Mar. Fish.—Canada. Department of Marine and Fisheries. Ottawa.
Ann. Rept.—Annual Report.
Canada Dom. Bur. Stat.—Canada. Dominion Bureau of Statistics. Ottawa.
Canada Fish. Branch.—Canada. Department of the Naval Service, Fisheries Branch. Ottawa.
Contrib. Canadian Biol.—Contributions to Canadian Biology.
Rept.—Report.
Canadian Chem. Met.—Canadian Chemistry and Metallurgy. Canadian Institute of Chemistry. Toronto.
Canadian Fish.—Canadian Fisherman. Montreal.
Canterbury Mus.—Conterbury Museum. Christchurch, New Zealand.
Rec.—Records.
Carnegie Mus.—Carnegie Museum. Pittsburg.
Ann.—Annals.
Mem.—Memoirs.
Catalina Islander.—Avalon, California.
Ceylon Mar. Biol.—Ceylon. Marine Biologist. Colombo.
Admin. Rept.—Administration Report.
Chem.-Zeit.—Chemiker-Zeitung. Cöthen.
Cong. Intern. Aqui. Pêch.—Congrès International d'Aquiculture et de Pêche. Paris.
Mém.—Mémoires et Compte-Rendus.
Cong. Intern. Pêch. Marit. Sables-d'Olonne.—Congrès International des Pêches Maritimes, d'Ostréiculture, et d'Aquiculture Marine. Sables-d'Olonne.
Cong. Nat. Pêch. Marit.—Congrès National des Pêches Maritimes. Tunis. Bordeaux.
C. R.—Mémoires et Comptes Rendus des Séances.
Cong. Pêch. Marit. Sables-d'Olonne.—Congrès des Pêches Maritimes des Sables d'Olonne.
C. R.—Comptes Rendus.
Cons. Explor. Mer.—Conseil Permanent International pour l'Exploration de la Mer. Copenhague.
Journ.—Journal du Conseil.

P. V.—Rapports et Procès-Verbaux.
Publ. Circ.—Publications de Circonstance.
Copeia.—New York.

D

Danish Oceanogr. Exped.—Danish Oceanographical Expeditions, 1908–1910, to the Mediterranean and Adjacent Seas. Copenhagen.
Rept.—Report.
Dove Mar. Lab.—Dove Marine Laboratory. Northumberland Sea Fisheries' Committee. Cullercoats.
Rept.—Report.

E

Ecology.—Lancaster, Pennsylvania.
England Insp. Fish.—England. Inspectors of Fisheries. London.
Ann. Rept.—Annual Report.
England Min. Ag. Fish.—England. Ministry of Agriculture and Fisheries. London.
Fish. Invest.—Fisheries Investigations.

F

Field Mus. Nat. Hist.—Field Museum of Natural History. Chicago.
Publ. Zool. Ser.—Publications. Zoological Series.
Fischerbote.—Der Fischerbote. Hamburg.
Fischwirtschaft.—Die Fischwirtschaft. Wesermünde.
Fish. Gaz.—Fishing Gazette. New York.
Fish. News.—Fishing News. Aberdeen, Scotland.
Fisk. Gang.—Fiskets Gang. Bergen.
Food Indus.—Food Industries. New York.
France Chamb. Dép.—France. Chambre des Députés. Paris.
France Comm. Études.—France. Commission d'Études. Paris.
France Min. Instruct. Publ.—France. Ministère de l'Instruction Publique. Paris.
Arch. Nat.—Archives Nationales.
France Min. Mar.—France. Ministère de la Marine. Paris.
France Min. Trav. Pub.—France. Ministère de Travaux Publics. Paris.
France Off. Sci. Pêch. Marit.—France. Office Scientifique et Technique des Pêches Maritimes. Paris.
Mém. (Sér. Spéc.)—Mémoires. (Série Spéciale.)
Notes.—Notes et Mémoires. *Continued as*
Notes.—Notes et Rapports. *Continued as*
Revue Trav.—Revue des Travaux.

H

Himmel und Erde.—Gesellschaft Urania. Leipzig; Berlin.

I

Indus. Eng. Chem.—Industrial and Engineering Chemistry. American Chemical Society. Washington.
Indus. Franç. Cons.—L'Industrie Française de la Conserve. Paris.
Inst. Catalana Hist. Nat.—Institució Catalana d'Historia Natural. Barcelona.
Butl.—Butlletí.
Inst. Gen. Tec. Valencia.—Instituto General y Tecnico de Valencia.
An.—Anales.
Inst. Océanogr. Monaco.—L'Institut Océanographique de Monaco. Monaco.
Ann.—Annales.
Bull.—Bulletin.

Inst. Pasteur.—Institut Pasteur. Paris.
Ann.—Annales.
Intern. Fish. Exhib. Lit.—International Fisheries Exhibition Literature. London
Ireland Insp. Fish.—Ireland. Inspector of Irish Fisheries. Dublin.
Rept.—Report.
Italy Com. Talasso.—Italy. Comitato Talassografico Italiano. Venezia.
Boll. Bimes.—Bollettino Bimestrale.
Mem.—Memoria.

J

Japan Imp. Fish. Bur.—Japan. Imperial Fisheries Bureau. Tokyo.
Journ.—Journal.
Japan Imp. Fish. Inst.—Japan. Imperial Fisheries Institute. Tokyo.
Journ.—Journal.
Journ. Anat. Physiol. London.—Journal of Anatomy and Physiology. Anatomical Society of Great Britain and Ireland. London.
Journ. Anat. Physiol. Paris.—Journal de l'Anatomie et de la Physiologie Normales et Pathologiques de l'Homme et des Animaux. Paris.
Journ. Biol. Chem.—Journal of Biological Chemistry. New York.
Journ. Econ.—Journal des Economistes. Paris.
Journ. Hyg.—Journal of Hygiene. Cambridge, England.
Journ. Infect. Dis.—Journal of Infectious Diseases. Memorial Institute for Infectious Diseases. Chicago.
Journ. Méd. Bordeaux.—Journal de Médicine de Bordeaux. Bordeaux.
Journ. Méd. Chir. Prat.—Journal de Médecine et de Chirugie Pratiques. Paris
Journ. Off.—Journal Officiel de la Republique Française. Paris.
Journ. Pharm.—Journal de Pharmacie et de Chimie. Société de Pharmacie de Paris. Paris.
Jugoslav. Akad.—Jugoslavenska Akademija Znanosti i Umjetmosti. Zagrab.
Rad.

L

Lab. Zool. Concarneau.—Laboratoire de Zoologie et de Physiologie Maritimes de Concarneau. Concarneau.
Trav. Sci.—Travaux Scientifiques.
Laguna Mar. Lab.—Laguna Marine Laboratory. Pomona College. Claremont California.
Ann. Rept.—Annual Report.
Lancashire Sea-fish. Lab.—Lancashire Sea-fisheries Laboratory. Liverpool University. Liverpool.
Rept.—Report.
Linnean Soc. London.—Linnean Society of London.
Journ. Zool.—Journal. Zoology.
Linnean Soc. New S. Wales.—Linnean Society of New South Wales. Sydney.
Proc.—Proceedings.
Liverpool Biol. Soc.—Liverpool Biological Society. Liverpool.
Trans.—Proceedings and Transactions. (Includes Report on the Lancashire Sea-fisheries Laboratory at University of Liverpool and Annual Report of Liverpool Marine Biology Committee.)

M

Madras Fish. Bull.—Madras Fisheries Department. Madras.
Bull.—Bulletin.
Mar. Biol. Assoc.—Marine Biological Association of the United Kingdom. Plymouth.
Intern. Fish. Invest.—International Fisheries Investigations. London.
Journ.—Journal.
Mechanics Mag.—Mechanics Magazine. London.
Med. Vissch.—Mededeelingen over Visscherij. Helder.
Miss. Italiana Esplor. Levante.—Missione Italiana per l'Esplorazione dei Mari Levante. Venezia.
Mus. Hist. Nat. Marseille.—Musée d'Histoire Naturelle de Marseille. Marseille
Ann. Zool.—Annales. Zoologie.

Mus. Hist. Nat. Paris.—Muséum d'Histoire Naturelle de Paris. Paris.
Bull.—Bulletin.
Mus. Nac. Cien. Nat.—Museo Nacional de Ciencias Naturales. Madrid.
Trab. Ser. Zool.—Trabajos. Serie Zoológica.

N

Nat. Geogr. Mag.—National Geographic Magazine. Washington.
Nat Hist.—Natural History. American Museum of Natural History. New York.
Nat. Siciliano.—Il Naturalista Siciliano. Palermo.
Nat. Tijdschr. Nederlandsch-Indië.—Natuurkundig Tijdschrift voor Nederlandsch-Indië. Batavia.
Nature.—London.
Nature.—Paris.
Naturhist. Tidsskr.—Naturhistorisk Tidsskrift. Kjøbenhavn.
New S. Wales Nat. Club.—New South Wales Naturalists Club. Sidney.
Mem.—Memoirs.
New York State Mus.—New York State Museum. Albany.
Bull.—Bulletin.
New Zealand Inst.—New Zealand Institute. Wellington.
Trans.—Transactions and Proceedings.
New Zealand Journ. Sci. Tech.—New Zealand Journal of Science and Technology. Wellington.
Norsk. FiskTid.—Norsk Fiskeritidende. Kjøbenhavn.

O

Oester. Fisch. Zeit.—Oesterreisches Fisherei-Zeitung. Wien.
Open Court.—Chicago.
Outlook.—New York.

P

Pacific Biol. Sta.—Pacific Biological Station. Biological Board of Canada. Nanaimo.
Prog. Rept.—Progress Report.
Pacific Fish.—Pacific Fisherman. Seattle.
Pacific Fish. Stat. No.—Pacific Fisherman Statistical Number. Seattle.
Pacific Sci. Fish. Inst.—Pacific Scientific Fisheries Institute. Vladivostok.
Bull.—Bulletin.
Pacific Sci. Fish. Res. Sta.—Pacific Ocean Scientific Fishery Research Station. Vladivostok.
Bull.—Bulletin.
Pan-Pacific Res. Instn.—Pan-Pacific Research Institution. Honolulu.
Journ.—Journal.
Pêch. Marit.—La Pêche Maritime. Paris.
Pest. Med.-Chir. Pres.—Pester Medicinisch-Chirurgische Presse. Budapest.
Philippine Journ. Sci.—Philippine Journal of Science. Philippine Islands. Bureau of Science. Manila.
Pop. Sci. Mon.—Popular Science Monthly. New York.

Q

Queensland Mus.—Queensland Museum. Brisbane.
Mem.—Memoirs.

R

R. Acad. Cien. Barcelona.—Real Academia de Ciencias y Artes de Barcelona.
Mem.—Memorias.
R. Cornwall Polytech. Soc.—Royal Cornwall Polytechnic Society. Falmouth.
Ann. Rept.—Annual Report.
R. Instn. Cornwall.—Royal Institution of Cornwall. Truro.
Journ.—Journal.

R. Phys. Soc. Edinburgh.—Royal Physical Society of Edinburgh.
Proc.—Proceedings.
R. Soc. S. Australia.—Royal Society of South Australia. Adelaide.
Trans.—Transactions and Proceedings.
R. Soc. Tasmania.—Royal Society of Tasmania. Tasmania.
Pap.—Papers and Proceedings.
R. Soc. Victoria.—Royal Society of Victoria. Melbourne.
Proc.—Proceedings.
R. Zool. Acclim. Soc. Victoria.—Royal Zoological and Acclimatisation Society of Victoria. Melbourne.
Proc.—Proceedings.
R. Zool. Soc. New S. Wales.—Royal Zoological Society of New South Wales. Sydney. Australian Zoological Handbook.
Rés. Camp. Sci. Monaco.—Résultats des Campagnes Scientifiques accomplies sur son Yacht par Albert Ier Prince Souverain de Monaco publiés sous sa Direction avec le Concours de M. Jules Richard. Monaco.
Revue Franç. Cons. Aliment.—Revue Française des Conserves Alimentaires. Paris.
Revue Gén. Sci.—Revue Générale des Sciences Pures et Appliquées. Paris.
Revue Marit. Colon.—Revue Maritime et Coloniale. Ministère de la Marine. Paris. *Continued as* Revue Maritime.
Revue Sci.—Revue Scientifique. Paris.
Revue Sci. Nat. Ouest.—Revue des Sciences Naturelles de l'Ouest. Paris.
Revue Thérap. Midi.—Revue Thérapeutique du Midi. Montpellier.
Riv. Mens. Pesca.—Rivista Mensile di Pesca. Società Lombarda per la Pesca e l'Acquicoltura. Pavia.

S

S. African Mus.—South African Museum. Cape Town.
Ann.—Annals.
S. Calif. Acad. Sci.—Southern California Academy of Sciences. Los Angeles.
Bull.—Bulletin.
Sci. American.—Scientific American. New York.
Sci. Mon.—Scientific Monthly. New York.
Scotland Fish. Bd.—Fishery Board for Scotland. Edinburgh.
Ann. Rept.—Annual Report.
Sci. Invest.—Scientific Investigations.
Scripps Instn. Oceanogr.—Scripps Institution of Oceanography. La Jolla, California.
Bull. Tech. Ser.—Bulletin. Technical Series.
Smithson. Instn.—Smithsonian Institution. Washington, D. C.
Misc. Coll.—Miscellaneous Collections.
Soc. Acad. Nantes.—Société Académique de Nantes et du Département de Loire-Inférieure.
Ann.—Annales.
Soc. Aqui. Pêch.—Société Centrale d'Aquiculture et de Pêche. Paris.
Bull.—Bulletin.
Soc. Arts.—Society of Arts. London.
Journ.—Journal.
Soc. Biol. Paris.—Société de Biologie. Paris.
C. R.—Comptes Rendus Hebdomadaire des Séances et Mémoires.
Soc. Chem. Ind.—Society of Chemical Industry. London.
Journ.—Journal.
Soc. Española Hist. Nat. Sociedad Española de Historia Natural. Madrid.
An.—Anales.
Bol.—Boletín.
Mem.—Memorias.
Soc. Ital. Sci. Nat.—Società Italiana di Scienze Naturali e Museo Civico di Storia Naturale. Milan.
Atti.
Soc. Linn. Maine-et-Loire.—Société Linnéenne du Département de Maine-et-Loire. Angers.
Ann.—Annales.

Soc. Nat. Acclimat.—Société Nationale d'Acclimatation de France. Paris.
Bull.—Bulletin. Revue des Sciences Naturelles Appliquées.
Soc. Nat. Napoli.—Società di Naturalisti in Napoli.
Boll.—Bollettino.
Soc. Océanogr. France.—Société d'Océanographique de France. Paris.
Bull.—Bulletin.
Soc. Philom.—Société de la Philomathique de Paris. Paris.
Bull.—Bulletin.
C. R.—Compte-Rendu.
Soc. Portugaise Sci. Nat.—Société Portugaise des Sciences Naturelles. Lisbonne.
Bull.—Bulletin.
Soc. Sci. Arcachon.—Société Scientifique d'Arcachon.
Trav.—Travaux des Laboratoires.
Soc. Sci. Hist. Nat. Corse.—Société des Sciences Historiques et Naturelles de la Corse. Bastia.
Bull.—Bulletin.
Soc. Sci. Nat. Maroc.—Société des Sciences Naturelles de Maroc. Maroc.
Bull.—Bulletin.
Soc. Sci. Nat. Ouest France.—Société des Sciences Naturelles de l'Ouest de la France. Nantes.
Bull.—Bulletin.
Soc. Tosc. Sci. Nat. Pisa.—Società Toscana di Scienze Naturali di Pisa. Pisa.
Atti.
Soc. Zool. France.—Société Zoologique de France. Paris.
Bull.—Bulletin.
Spain Inst. Español Oceanogr.—Spain. Ministerio de Marina. Dirección General de Pesca. Instituto Español de Oceanografía. Madrid.
Bol. Pescas.—Boletín de Pescas.
Not. Res.—Notas y Resúmenes.
Res. Camp.—Resultado de las Campañas Realizadas por Acuerdos Internacionales.
Trab.—Trabajo.
Spain Mar. Merc. Pesc.—Spain. Marina Mercante y de la Pesca Marítima. Madrid.
An. Estadís.—Annuario Estadístico.
St. Bartholomew's Hosp. Journ.—St. Bartholomew's Hospital Journal. London.
St. Nicholas Mag.—St. Nicholas Magazine. New York.
Sta. Aqui. Boulogne-sur-Mer.—Station Aquicole de Boulogne-sur-Mer.
Ann.—Annales.
Sta. Aqui. Pêch. Castiglione.—Station d'Aquiculture et de Pêche de Castiglione. Alger.
Bull.—Bulletin des Travaux.
Sta. Biol. Arcachon.—Station Biologique d'Arcachon. Université de Bordeaux et Société Scientifique d'Arcachon. Bordeaux.
Bull.—Bulletin.
Sta. Biol. Lisbonne.—Station Biologie Maritime de Lisbonne. Lisbonne.
Trav.—Travaux.
Sta. Océanogr. Salammbô.—Station Océanographique de Salammbô. Carthage.
Bull.—Bulletin.
Stanford Univ.—Stanford University. Palo Alto.
Contrib. Biol. Hopkins Lab.—Contributions to Biology from the Hopkins Seaside Laboratory.
Publ. Univ. Ser.—Publications. University Series.
Svenska VetAkad.—Svenska Vetenskapsakademien. Stockholm.
Öfver.—Öfversigt af Förhandlingar.
Switzerland Lebensm. Hyg.—Gebiete der Lebensmitteluntersuchung und Hygiene. Bern.
Mitt.—Mitteilungen.

T

Tech. Mus. Sydney.—Technical Museum. Sydney.
Tech. Ed. Ser.—Technical Education Series.
Tokyo Coll. Agric.—Tokyo. Imperial University. College of Agriculture.
Journ.—Journal.

Treubia.—Recueil de Travaux Zoologiques, Hydrobiologiques et Océanographiques. Batavia.

U

U. S. B. F.—United States Bureau of Fisheries. United States Department of Commerce. Washington, D. C.
Bull.—Bulletin.
Mem. Ser.—Memorandum Series.
U. S. Comm. Fish.—United States Commissioner of Fisheries. Washington, D. C.
Rept.—Report.
U. S. D. A.—United States Department of Agriculture. Washington, D. C.
Bull.—Bulletin.
(This department includes the United States Bureau of Fisheries.)
U. S. D. C.—United States Department of Commerce. Washington, D. C.
Fish. Sci. Trade—Fisheries Science and Trade.
Fish. Serv. Bull.—Fisheries Service Bulletin.
Food. 'Round World.—Foodstuffs 'Round the World. Fishery News.
U. S. Nat. Mus.—United States National Museum. Washington, D. C.
Bull.—Bulletin.
Proc.—Proceedings.
Union S. Africa Fish. Mar. Biol. Surv.—Union of South Africa. Fisheries and Marine Biological Survey. Pretoria.
Rept.—Report.
Univ. Calif.—University of California. Berkeley.
Publ. Health.—Publications in Public Health.
Publ. Zool.—Publications in Zoology.

W

Wernerian Nat. Hist. Soc.—Wernerian Natural History Society. Edinburgh.
Mem.—Memoirs.
West. Can. Pack.—Western Canner and Packer. San Francisco.
West Coast Fish.—West Coast Fisheries. *Formerly* California Fisheries. San Pedro, California.
Wissen. Meeresunter.—Wissenschaftliche Meeresuntersuchungen. Biologische Anstalt auf Helgoland. Kommission zur Wissenschaftlichen Untersuchungen der Deutschen Meere in Kiel. Berlin.
Abt. Kiel.—Abteilung Kiel.

Y

Yacht.—Le Yacht. Paris.

Z

Zeitschr. Ang. Chemie.—Zeitschrift für Angewandte Chemie. Deutsche Gesellschaft für Angewandte Chemie; Verein Deutschen Chemiker. Berlin & Leipzig.
Zool. Inst. Univ. Wien.—Zoologischen Institut der Universität Wien und der Zoologischen Station in Triest. Wien.
Arb.—Arbeiten.
Zool. Soc. London.—Zoological Society of London. London.
Proc.—Proceedings.
Trans.—Transactions.
Zool. Sta. Neapel.—Zoologische Station zu Neapel. Naples.
Mitt.—Mitteilungen.
Zoologist.—London.

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ABNORMALITIES
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ALAUSA MELANOSTICTA. See *Sardina melanosticta.*
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California
Calif. Dept. Comm. Fish., 1919.2, 1920.2, 1923.1, 1928.1.
Calif. Fish Game, 1916.2.
Pacific Fish., 1918.6, 1920.2, 1930.4.
West Coast Fish., 1929.8.
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Brown, C. I., 1918.
Dyrenforth, 1887.
Hall, 1898.
Pacific Fish., 1917.3, 1918.1.
Wheeler, 1917.
Trade-marks
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Pacific Fish., 1918.2.

CHEMICAL COMPOSITION
Brocklesby and Denstedt, 1930.
Clark, E. D., and Clough, R. W., 1926.
Dill, 1921.1, 1921.2, 1921.3, 1926, 1929.
Dunn, Max S., 1926.
Dunn, Max S., and Hollombe, 1927.
Finn, 1931.
Hinard, 1929.
Johnstone, 1919.
Langton, 1923.
Maljean, 1894.
Manning, 1930.
Mitchell, 1883.
Oku, 1904.
Pacific Fish., 1927.1.
Pentegoff and Niankovskaya, 1928.
Pérard, 1909.2.
Seskiné and Akiyama, 1926.
Suzuki and Mihata, 1912.
Taylor, 1926.
Thomas, 1926.
Tressler, 1923.
Tressler and Wells, 1925.
Von Fellenberg, 1923.
Weber and Wilson, 1919.
Wells, 1925.
Wewers, 1930.

CLASSIFICATION
Buen, F., 1927.3.
Chabanaud, 1926.
Cligny, 1913.
Cuvier and Valenciennes, 1831.
Hubbs, 1929.
Günther, 1868.
Jordan, 1923.
Sedgwick, 1905.
Steuer, 1908.

CLUPANODON CAERULEUS. See *Sardina caerulea.*
Authors using former name
Breder, 1928.
Gilbert, 1896, 1899.
Greene and Greene, 1915.
Holder, 1912.
Jordan and Evermann, 1896.1, 1908.
Jordan and Starks, 1895.
Starks, 1911.

CLUPANODON MELANOSTICTUS. See *Sardina melanosticta.*
Authors using former name
Günther, 1868.
Jordan and Snyder, 1901.
M'Coy, 1867.

CLUPANODON NEOPILCHARDUS. See *Sardina neopilchardus.*
Authors using former name
Fowler, 1911.
Roughly, 1916.
Stead, 1906, 1908.
Waite, 1899, 1904, 1905.

CLUPANODON PILCHARDUS. See *Sardina pilchardus.*
Authors using former name
Cockerell, 1914.
Risso, 1826.

CLUPANODON PSEUDOHISPANICUS. *See Sardina pseudohispanicus.*
Authors using former name
Cockerell, 1914.
Evermann and Kendall, 1900.
Evermann and Marsh, 1902.
Fowler, 1911.
Jordan and Evermann, 1896.1, 1908.
Kendall, 1908.
Linton, 1901.
Smith, H. M., 1898.
Sumner, Osburn and Cole, 1913.
Weymouth, 1910.

CLUPANODON PUNCTATUS.
Description
Regan, 1917.
Distribution
Regan, 1917.
Synonomy
Regan, 1917.

CLUPANODON SAJAX. See *Sardina sajax.*
Authors using former name
Abbott, 1900.
Fowler, 1916.

CLUPANODON SARDINA. See *Sardina pilchardus.*
Authors using former name
Risso, 1826.

CLUPANODON THRISSA.
Description
Regan, 1917.
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Regan, 1917.
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Regan, 1917.

CLUPEA.
Description
Gill, 1862.

CLUPEA CAERULEA-VITTATA.
Coloration
Richardson, 1845.
Description
Richardson, 1845.
Recorded from Japan
Richardson, 1845.

CLUPEA CAERULEUS. See *Sardina caerulea.*
Authors using former name
Jordan and Evermann, 1896.2.
Meek, 1916.

CLUPEA FIMBRIATA.
Mentioned
Hornell, 1910.
Migrations
Hornell, 1910.

CLUPEA LILE.
Mentioned
Hornell, 1910.
Migrations
Hornell, 1910.

CLUPEA LONGICEPS. See *Sardinella longiceps.*
Authors using former name
Hornell, 1910.

CLUPEA MELANOSTICTA. See *Sardina melanosticta.*
Authors using former name
Günther, 1868.
Kishinouye, 1907.
M'Coy, 1867.
Seskiné and Akiyama, 1926.
Temminck and Schlegel, 1850.

CLUPEA NEOPILCHARDUS. See *Sardina neopilchardus.*
Authors using former name
Klunzinger, 1880.
McCulloch, 1911.
Steindachner, 1879.

CLUPEA OCELLATA. See *Sardina ocellata.*

CLUPEA PILCHARDUS. See *Sardina pilchardus.*

CLUPEA PSEUDOHISPANICA. See *Sardina pseudohispanica.*

CLUPEA SAJAX (Sagax). See *Sardina Sajax.*

CLUPEA SARDINA. See *Sardina pilchardus.*
Authors using former name
Bean, 1880.
Blanchère, 1868.
Caillo, 1855.
Calderón, 1889.
Devedjian, 1926.
Gobin, 1891.
Graeffe, 1886.
Jordan, 1887.3.
Lacépède, 1829.
Lombardo, 1884.
Lowe, R. T., 1837.
Machado, 1857.
Perugia, 1866.
Risso, 1810.
Simmonds, 1879.

CLUPEA SARDINITES.
Description
Kramberger-Gorjanovic, 1883.
Woodward, 1901.
Fossils from
Lower Oligocene, Croatia
Woodward, 1901.
Oligocene, Rumania
Pauca, 1929.
Synonomy
Woodward, 1901.
Tertiary of Croatia
Kramberger-Grojanovic, 1883.

CLUPEA SENEGALENSIS.
Listed from west coast of Africa
Gruvel and Bouyat, 1906.

COMMERCIAL CATCH ANALYSIS
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Thompson, W. F., 1926.1.

COMMON NAMES
Africa
Joubin and Le Danois, 1924.
Australia
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England
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Le Danois, 1913.
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Blanchère, 1868.
Caraffa, 1929.
Carus, 1889.
Cligny, 1913.
Hoek, 1914.2.
Joubin and Le Danois, 1924, 1928.
Lacépède, 1829.
Moreau, E., 1881.
France
Guérin-Ganivet, 1912.
Le Danois, 1913, 1921.
Italy
Canestrini, 1871.
Japan
Jordan and Hubbs, 1925.
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Mori, 1930.
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Lowe, R. T., 1837.
Spain
Buen, F., 1922.1, 1926.2.
Buen, O., 1910, 1912.1, 1912.2.
Pardo Garcia, 1919, 1921.
Turkey
Bauer, 1921.

CONFLICT BETWEEN FISHERMEN, BUYERS AND CANNERS—FRANCE

Bull. Trim. Pêch. Marit., 1911.2, 1913.2, 1913.3.
Guyader, 1926.
Pêch. Marit., 1927.1, 1927.2, 1928.4, 1929.1.
Petit, Benoit, Rivoal and Touchard, 1913.
Saint-Léon and Seilhac, 1913.

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California
Calif. Fish., 1929.1.
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Skogsberg, 1925.
Thompson, W. F., 1922, 1923, 1926.
Thompson, W. F., and Higgins, 1923.

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Fabre-Domergue, 1896.
Mader, 1909.
Odin, 1894.
Renduel, 1888.
Ropers, 1906.

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Fay, 1929.
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West Coast Fish., 1930.3.

COST OF FISHING EQUIPMENT—FRANCE

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DECLINE IN FISHERY

California
Clark, F. N., 1930.1.
Lindner, 1930.2.
Scofield, N. B., 1928.2.

France
Baudouin, 1893.2.

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California
Scofield, N. B., 1921.2.
Scofield, W. L., 1930.1.

France
Pouchet, 1887.3, 1891.2.

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French
Cligny, 1913.

Pilchard
Houghton, W., 1883.

Sardine
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California
Bonnot, 1930.
Scofield, N. B., 1924.1.
Skogsberg, 1925.
Thompson, W. F., and Higgins, 1923.

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Delcassé, 1912.
Le Bail, 1912.
Pêch. Marit., 1923.
Pouchet, 1887.3.

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DISASTER TO BOATS

Wreck caused by large school sounding in net
Calif. Fish., 1929.2.

Wrecks and fires
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DISEASE IN MAN CAUSED BY SARDINES

Saint-Sévrin, 1894.

DISEASE OF SARDINES

Sardina pilchardus
Johnstone, 1911, 1925.

DISTRIBUTION OF COMMERCIAL PRODUCT

Argentier, 1919.
Berthoule, 1887.2.
Bullen, 1904.
Duhamel du Monceau, 1772.
Dumont, 1919.
Guyader, 1926.
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ECONOMIC CONDITIONS OF FACTORY WORKERS

Calléja, 1930.
Gerville-Réache, 1888.
Hautot, 1930.
Seilhac, 1903.
Smith, H. M., 1902.1.

ECONOMIC CONDITIONS OF FISHERMEN

England
Bertram, 1883.
Couch, 1835.

France
Berthoule, 1887.2.
Bull. Trim. Pêch. Marit., 1911.2, 1913.2, 1913.3.
Calléja, 1930.
Ferrari, 1887.
Guyader, 1926.
Kerzoncuf, 1917.
Lebour, 1909.
Le Goffic, 1912.
Lemy, 1912.
Mader, 1909.
Müller, 1909.
Oeuvre, 1913.
Pêch. Marit., 1927.1, 1927.2, 1929.1.

ECONOMIC CONDITIONS OF FISHERMEN—Continued.

France—Continued.
Pouchet, 1887.3.
Ropers, 1906.
Seilhac, 1903.
Smith, H. M., 1909.

Portugal
Huhlein, 1931.

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Sardina caerulea
Calif. Fish Game, 1929.2.
Pacific Fish., 1929.4.
Scofield, E. C., and Lindner, 1930.
West Coast Fish., 1929.2, 1929.3.

Sardina melanosticta
Kamiya, 1925.
Kishinouye, 1907.

Sardina pilchardus
Aflalo, 1904.2.
Arné, 1927.
Barnard, 1925.
Biétrix, 1890.
Buchanan-Wollaston, 1911.
Buckland and Walpole, 1879.
Buen, F., 1927.3, 1929.1, 1930.
Cunningham, 1888, 1891, 1893, 1896, 1912.
Ehrenbaum 1909, 1927.
Fabre-Domergue and Biétrix, 1896.1, 1896.2, 1896.3.
Hefford, 1910.
Holt, 1897, 1899.
Holt and Scott, 1897.
Joubin, 1913.
Kyle and Ehrenbaum, 1929.
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Marion, 1894.1, 1894.3.
Meek, 1916.
Pouchet, 1889.1, 1889.5, 1891.1, 1891.4.
Prince, 1907.
Raffaele, 1888.
Roché, 1893.2.
Roule, 1914.
Russo, 1925.
Steuer, 1908.

Six sardine-like species from Java Sea
Delsman, 1926.

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Sardina melanosticta
Kishinouye, 1907.

Sardina pilchardus
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Day, 1880, 1883.
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Dill, 1921.3.
Higgins, 1926.
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Sardina melanosticta
Kishinouye, 1907.

Sardina pilchardus
Belloc, 1930.
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Fage and Legendre, 1914.
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Sardinella longiceps
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Faber, 1883.
Krisch, 1900.

Africa
Gruvel and Bouyat, 1906.

Algeria
Argentier, 1919.
Bonnard, 1902.
Darboux *et al*, 1906.
Gruvel, 1926.1.
Peixotto, 1884.

British Columbia
British Columbia Comm. Fish., 1919.
Canadian Fish., 1928, 1929.4.
Pacific Fish., 1927.3.

California
Brown, C. M., 1930.
Calif. Bur. Comm. Fish., 1929.1, 1929.2, 1930.1, 1930.2.
Calif. Dept. Comm. Fish., 1916, 1917, 1919.1, 1919.2, 1920.1, 1920.2, 1921, 1921+, 1922, 1923.1, 1923.2, 1924, 1925, 1926, 1927, 1928.1, 1928.2,
Calif. Fish., 1929.3, 1929.4.
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Fiedler, 1930.2.
Fish. News, 1930.
Jordan, 1887.4.
Lindner, 1930.2.
Pacific Fish., 1915+, 1926.4, 1927.3, 1928.3.
Scofield, N. B., 1919.3, 1921.2, 1927, 1928.2, 1929.1, 1929.2, 1929.3.
Scofield, W. L., 1923, 1928.1, 1928.2, 1929.2, 1929.3, 1929.4, 1930.1, 1930.3.
Terry, 1929.
Thompson, W. F., 1921.2, 1921.6, 1922.
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Whitehead, 1929.
Wilcox, 1898.

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Hemming, 1919.

Corsica
Argentier, 1919.

England
Aflalo, 1904.1.
Barron, 1897+.
Borlase, 1758.
Buckland and Walpole, 1879.
Bullen, 1904.
Cornish, 1883.1, 1870, 1872, 1880.
Couch, 1835, 1840.
Courtenay, 1837, 1840.
England Bd. Ag. Fish., 1906+.
Kyle, 1929.
Lemon, 1785.
Murie, 1903.

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England—Continued.
Pengelly, 1928.
Swithinbank and Bullen, 1914.

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Vienkoff, 1893.

Europe
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Noël de la Morinière, 1815.
Steuer, 1908.

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Argentier, 1919.
Arné, 1928.2, 1929.
Baudouin, 1888, 1893.1, 1893.2.
Belloc, 1930.
Bonnassieux, 1900.
Bouchon-Brandeley, 1887.
Bouvier-Lapierre, 1887.
Boyer, 1912.
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Caillo, 1855.
Cligny, 1913, 1914.
Cloarec, 1913.
Delcassé, 1912.
Deslandes, 1727.
Fabre-Domergue, 1908.1.
Fischerbote, 1931.
Fish. Gaz., 1909.
Gourret, 1889.1, 1894.1, 1894.2, 1894.3, 1894.4, 1894.5, 1894.6, 1894.7, 1897.
Hérubel, 1912.
Kerzoncuf, 1916, 1917.
Larousse Universel, 1923.
Launette, 1876, 1882, 1887, 1888.
Le Bour, 1909.
Le Danois, 1921, 1930.
Lemy, 1919.2, 1926.
Lübbert, 1931.
Mader, 1909.
Marchis, 1930.
Marion, 1888, 1894.4.
Martinet, 1887.
Moreau, R, 1927.
Odin, 1894, 1895.
Ouizille, G., 1912.1, 1912.2.
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Peixotto, 1884.
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Ravertet-Wattel, 1909.
Roché, 1894.2.
Rodel, 1912.
Saint-Léon and Seilhac, 1913.
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Seilhac, 1903.
Trévédy, 1888.
Vauvert, 1870.
Vignols and Sée, 1926.
Ws., 1921.

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Philippine Islands
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Pêch. Marit., 1924.3.
Ramalho, 1927.

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Alaejos Sanz, 1923.
Bolin y de la Cámera, 1922.
Buen, F., 1922.2, 1927.2.
Buen, O., 1923.
Cornide, 1788.
Dominguez, 1922.
Hérubel, 1912.
Miranda y Rivera, 1923.
Revue Marit., 1904.

Tunis
Bourge, 1919.
Darboux *et al*, 1906.
Fages and Ponzevera, 1908.
Gruvel, 1926.2.
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Godsil, 1930.2.
Lindner, 1930.2.
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Spain
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Algeria
Argentier, 1919.
Bounhiol, 1923.2.
Garau, 1909.
Gruvel, 1926.1.

Australia
Roughly, 1916.

Black Sea
Antipa, 1906.

British Columbia
Avard, 1918.
Canadian Fish., 1919.
Pacific Fish., 1926.2.

California
Bonnot, 1930.
Brown, C. M., 1930.
Calif. Fish Game, 1920, 1930.2.
Dahl, 1920.
Fry, 1931.
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Higgins and Holmes, 1921.
Lemy and Montariol, 1918.
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Scofield, W. L., 1926.1, 1930.4.
Skogsberg, 1925.
Smith, H. M., 1895.
Thompson, W. F., 1926.1.
Thompson, W. F., and Higgins, 1923.
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Buckland, 1881.
Carew, 1811.
Collins, W. W., 1851.
Couch, 1835, 1867.
Courtenay, 1837.
Cunningham, 1912.
Davis, 1927.
Day, 1880, 1883.
Duhamel du Monceau, 1772.
Duke of Edinburgh, 1883.
Dunn, Matthias, 1888.1.
Hamilton, 1843.
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Kyle, 1929.
Nilsson, 1855.
Pengelly, 1928.
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Russell, E. S., 1915.
Sauvage, 1865.
Sherrin, 1886.
Smith, W. A., 1883.1.
Swainson, 1838.
Wilcocks, 1865, 1883.
Willughby, 1685.
Wright, 1922.
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Thompson, W. F., 1926.1.

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Argentier, 1919.
Barclay, 1910.
Baudouin, 1888, 1893.2.
Bénard, 1903.
Bénard and Künstler, 1903.
Benoit, 1912.
Blanchère, 1868.
Bonneff, 1911.
Bott, 1912.
Boyer, 1913.
Caillo, 1855.
Cassigneul, 1928.
Cunningham, 1912.
Cuvier and Valenciennes, 1831, 1848.
Delidon, 1866, 1869.
Deno, 1923.
Dumont, 1919.
Fabre-Domergue, 1912, 1913.
Fischerbote, 1931.
Fish. Gaz., 1917.
FiskTid, 1882.
Fouché, 1923.1.
Gerville-Réache, 1888, 1908.
Gourret, 1894.7.
Guyader, 1926.
Hérubel, 1912.
Jacobson, 1883.
Jacquème, 1926.
Kerzoncuf, 1917.
Künstler, 1903.
Landrieu, 1904.
Larousse Universel, 1923.
Le Bail, 1912.
Le Gall, 1930, 1931.
Lowe, J., 1864.
Lübbert, 1931.
Mader, 1909.
Martinet, 1887.
Moniteur de la Pisciculture, 1886.
Müller, 1909.
Odin, 1894.
Pêch. Marit., 1924.5, 1926.5.
Polidor, 1908.
Pouchet, 1887.1, 1888.2.
Ravertet-Wattel, 1909.
Roché, 1894.1, 1894.2, 1894.3.
Rodel, 1913.
Ropers, 1906.
Sauvage, 1865.
Sée, 1929.2.
Seilhac, 1903, 1905.
Simmonds, 1879.
Smith, H. M., 1902.1, 1904, 1909.
Soc. Arts, 1882.
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India
Scofield, N. B., 1925.

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Mediterranean
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Duhamel du Monceau, 1772.
Fage, 1909.

Morocco
Bronkhorst, 1923.

New Zealand
Phillipps, 1929.

Portugal
Bénard, 1903.
Fish Trades Gaz., 1931.
Fischerbote, 1930.
Huhlein, 1931.
Pêch. Marit., 1924.3, 1928.5.
Potigny and Fabre-Domergue, 1908.
Silva, 1892.

Sicily
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Albert I, 1887.
Bénard, 1903.
Brown, C. I., 1918.
Buen, F., 1928.2.
Chute, 1929.1.
Delgado, 1921.
Miranda y Rivera, 1923.
Potigny and Fabre-Domergue, 1908.
Reguart, 1791.
Rodriguez, 1908.
Santamaría, 1923.

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Sauvage, 1865.
Sherrin, 1886.
Smith, W. A., 1892.

Tunis
Fages and Ponzevera, 1908.

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Washington (State)
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Argentier, 1919.

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M'Coy, 1867.

California
Higgins, 1923, 1926.
Thompson, W. F., 1921.4.

Corsica
Argentier, 1919.

England
Aflalo, 1904.1.
Cornish, 1872.
Russell, F. S., 1930.
Smith, H. M., 1905.

Europe
Buen, F., 1929.2.
Thompson, W. F., 1926.1.

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Aflalo, 1904.1.
Argentier, 1919.
Bouvier-Lapierre, 1887.
Deslandes, 1727.
Fage, 1920.1, 1920.2.
Guyader, 1926.
Henneguy, 1891.
Launette, 1888.
Pouchet, 1887.3.
Ravertet-Wattel, 1909.
Smith, H. M., 1905.

Portugal
Neuparth, 1923.

Sicily
Russo, 1925.

Spain
Buen, F., 1927.2.

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Sardina caerulea
British Columbia Comm. Fish., 1931.
Lewis, 1929.
Parr, 1930.
Thompson, W. F., 1926.1.

Sardina melanosticta
Kishinouye, 1907.

Sardina neopilchardus
Roughly, 1916.

Sardina pilchardus
Albert I, 1887.
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Bénard, 1903.
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Cépède, 1907, 1908, 1910.1, 1910.2.
Chester, 1835.
Couch, 1835, 1867.
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Dunn, Matthias, 1892.2.
Fabre-Domergue, 1896.
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Houghton, W., 1883.
Jacquème, 1926.
Künstler, 1903.
Lebour, 1919, 1920, 1921.2, 1927.
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Monticelli, 1887.
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Roché, 1893.1.
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Sauvage, 1865, 1886, 1889, 1890.
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Steuer, 1908.
Sumner, Osburn and Cole, 1913.
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Vaillant and Henneguy, 1888.
Wilcocks, 1883.
Yarrell, 1836.

Sardina pseudohispanica
Sumner, Osburn and Cole, 1913.

Sardina sajax
Arthur, 1883.

Sardinella longiceps
Hornell, 1910.
Hornell and Nayudu, 1924.

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Sardina caerulea
Beard, 1921.
Christo, 1931.
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Sardina pilchardus
Day, 1883.
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Pérard, 1909.2.
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FOSSILS

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Kramberger-Gorjanovic, 1883.
Pauca, 1929.
Woodward, 1901.

Meletta sardinites
Heckel, 1850.
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Scofield, N. B., 1923.1.
Thompson, W. F., 1926.2.

Sardina melanosticta
Kishinouye, 1907.

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Bounhiol, 1916, 1919.2.
Buen, F., 1927.3, 1929.3.
Couch, 1867.
Cunningham, 1891, 1892.1, 1892.2, 1892.3, 1892.4, 1894.5, 1896, 1912.
Dunn, Matthias, 1892.2.
Fage, 1912.2, 1913, 1920.1, 1920.2.
Gourret, 1894.2, 1894.3.
Hjort, 1913.
Jacquème, 1926.
Joubin, 1913.
Lebcur, 1921.1.
Le Danois, 1929.
Le Gall, 1928.1, 1928.2, 1930.
McIntosh and Masterman, 1897.
Marion, 1891.2, 1894.1.
Meek, 1916.
Navarro, 1926.
Pouchet, 1889.1, 1889.6, 1890.2.
Ramalho, 1927.
Ramalho and Boto, 1930.
Regan, 1916.1.
Roché, 1894.4.
Roule, 1929.
Storrow, 1915.

Sardina sajax
Regan, 1916.1.

Sardinella longiceps
Hornell and Nayudu, 1924.

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Sardina neopilchardus
Phillipps, 1929.

Sardina pilchardus
Baudouin, 1893.2.
Cunningham, 1896.
Day, 1883.
Dumont, 1919.
Moreau, E., 1881.
Ropers, 1906.
Roule, 1914.
Vaillant and Henneguy, 1888.

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Sardina caerulea
Goode, 1903.
Lewis, 1929.

Sardina melanosticta
Kishinouye, 1907.

Sardina neopilchardus
McCulloch, 1919, 1922.
Roughly, 1916.

Sardina pilchardus
Aflalo, 1904.2.
Cornish, 1883.3.
Couch, 1867.
Day, 1880.
Dunn, Matthias, 1886, 1887, 1892.1.
McIntosh and Masterman, 1897.
Parnell, 1838.
Ravertet-Wattel, 1909.
Sauvage, 1865.
Smith, W. A., 1892.
Swithinbank and Bullen, 1913.

Sardina sajax
Goode, 1903.
Murphy, 1923.

HARENGULA PUNCTATA = CLUPEA SAJAX

Description
Bleeker, 1853.

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Authors using former name
Goode and Bean, 1880.
Poey y Aloy, 1856.

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California
Brown, C. M., 1930.
Fiedler, 1930.2.
Jordan, 1887.4.
Lindner, 1931.
Smith, H. M., 1896.
Thompson, W. F., 1921.6, 1922.
U. S. Tariff Comm., 1925.
West Coast Fish., 1930.2.
Wilcox, 1898.

England
Couch, 1835, 1840.
Courtenay, 1837.

Europe
Steuer, 1908.

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Baudouin, 1893.1, 1893.2.
Bonnassieux, 1900.
Cligny, 1913, 1914.
Deslandes, 1927.
Le Bour, 1909.
Mader, 1909.
Moreau, 1927.
Odin, 1894.
Ouizille, G., 1912.2.
Ouizille, H., 1926.1, 1926.2, 1926.3.
Pouchet, 1888.2.
Roché, 1894.2.
Saint-Léon and Seilhac, 1913.
Sée, 1925, 1929.1, 1929.2.
Trévédy, 1888.
Vignols and Sée, 1926.

Maine
Earll, 1877.2.
Earll and Smith, 1889.
Hall, 1898.

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Currents
Blavier, 1882.
Gifford, 1883.
Gourret, 1889.2.
Launette, 1888.
Mader, 1909.
Ravertet-Wattel, 1909.
Ropers, 1906.

Density of water
Arné, 1927, 1928.2.
Mader, 1909.

Electricity
Bounhiol, 1919.1.
Ropers, 1906.

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In general
Thoulet, 1913.

Salinity
Belloc, 1930.

Storms
Bounhiol, 1917.2, 1924.

Temperature of water
Arné, 1927, 1928.2.
Belloc, 1930.
Blavier, 1882.
Bounhiol, 1919.1.
Buen, F., 1927.3, 1927.4, 1929.3.
Gourret, 1889.2.
Hérubel, 1912.
Le Gall, 1930.
Mader, 1909.
Ravertet-Wattel, 1909.
Roule, 1929.
Thompson, W. F., 1926.1.
Vaillant and Henneguy, 1888.

Winds
Baudouin, 1893.2.
Mader, 1909.
Pouchet, 1889.1.
Ropers, 1906.

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IMPROVEMENT OF FRENCH FISHERY

Government aid
Fish. Gaz., 1920.

Report of progress
Fish. Gaz., 1917.

Suggestions
Amieux, 1909.
Bénard, 1903.
Bénard and Kunstler, 1903.
Benoit, 1912.
Boyer, 1912.
Bull. Trim. Pêch. Marit., 1913.3.
Canu, 1908, 1912.
Chauvin, 1909.
Cloarec, 1913.
Fabre-Domergue, 1912.
Fabre-Domergue and Biétrix, 1896.3.
Fouché, 1923.1, 1923.2.
Gerville-Réache, 1908.
Gruvel, 1913.
Hérubel, 1912, 1919.
Lemy, 1912.
Mader, 1909.
Madurec, 1912.
Odin, 1891, 1896.
Pêch. Marit., 1924.5, 1926.5, 1928.7.
Pérard, 1909.1, 1913.3.
Pouchet, 1887.1.
Rodel, 1912.
Ropers, 1906.
Rouillon, 1898.
Seilhac, 1903, 1905.

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Algeria
Argentier, 1919.
Gruvel, 1926.1.

British Columbia
British Columbia Comm. Fish., 1930.
Canadian Fish., 1928, 1929.1, 1929.5.
Hemming, 1919.
Pacific Fish., 1924.3, 1927.3.
Scofield, N. B., 1925.

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Bol. Pescas, 1929.
Calif. Fish Game, 1917, 1930.2.
Collins, J. W., 1892.
Ehrenbaum, 1929.
Fish. Gaz., 1918.
Fish Trades Gaz., 1930.
Griffin, 1904.1.
Lindner, 1931.
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1930.1, 1930.4, 1931.1, 1931.3.
Quibbon, 1927.
Radcliffe, 1923.1.
Scofield, N. B., 1917, 1921.2, 1929.2.
Scofield, W. L., 1923, 1928.1, 1928.
1930.3, 1930.4, 1931.
Soc. Océanogr. France, Bull., 1922.
Tendick, 1931.
West Coast Fish., 1929.7, 1930.9.
Wilcox, 1907.

England
Borlase, 1758.
Bullen, 1904.
Fish Trades Gaz., 1930.

Europe
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Argentier, 1919.
Belloc, 1930.
Berthoule, 1887.2.
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Candace, 1927.
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Fish. Gaz., 1909.
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Guyader, 1926.
Hérubel, 1912, 1919.
Kerzoncuf, 1917.
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Lemy, 1926.
Lowe, J., 1864.
McKay, 1922.
Mader, 1909.
Moreau, R., 1924, 1927.
Nicolas, 1913.
Pêch. Marit., 1927.1, 1927.2, 1928.2.
Pouchet, 1888.2.
Smith, H. M., 1902.1.
Ws., 1921.

Maine
Earll, 1887.1.
Earll and Smith, 1889.
Goto (no date).
Hall, 1898.
Kemp, 1885.
U. S. D. C., Fish Serv. Bull., 1921.

Norway
U. S. D. C., Fish. Sci. Trade, 1930.

Portugal
Fischerbote, 1930.
Potigny and Fabre-Domergue, 1908.

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Possibilities in

New South Wales
Scofield, N. B., 1925.

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Brown, C. I., 1918.
Ducloux, 1901.
Hérubel, 1912.
Potigny and Fabre-Domergue, 1908.
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Perwinck, 1919.

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INTERNATIONAL QUESTIONS

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KEYS FOR IDENTIFICATION
Buen, F., 1930.
Walford, 1931.1.

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Autran, 1912.
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Carlson, G., 1921.
Dumont, 1919.
Fish. Gaz., 1912.
Fish Trades Gaz., 1912.
Fisk. Gang, 1930.1.
Greffe, 1930.
Hjort, 1913.
Hoek, 1912.
Kerzoncuf, 1917.
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Lübbert, 1914.
Nature, 1912.
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West Coast Fish., 1929.2.

Sardina melanosticta
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Sardina neopilchardus
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Sardina pilchardus
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Clark, R. S., 1914, 1920.
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Ehrenbaum, 1909, 1927.
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Lebour, 1921.1.
Le Gall, 1928.2.
McIntosh and Masterman, 1897.
Marion, 1889.2, 1894.1, 1894.3.
Mazarelli, 1910.
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Ravertet-Wattel, 1909.
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Roule and Angel, 1924.
Steuer, 1908.

Sardina sajax
Barnard, 1925.

Six sardine-like species from Java Sea
Delsman, 1926.

Vertical distribution
Russell, F. S., 1926.

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Andrews, 1928.
British Columbia Comm. Fish., 1931.
Clark, F. N., 1928, 1930.2, 1931.
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Sardina melanosticta
Oku, 1904.

Sardina pilchardus
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Bouvier-Lapierre, 1887.
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Sauvage, 1890.
Smith, H. M., 1905.

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Scofield, E. C., and Lindner, 1930.
Sardina pilchardus
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Houghton, M. T., 1930.
Scofield, N. B., 1922.
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Pacific Fish., 1915+, 1929.9, 1930.7.
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Ouizille, H., 1926.4.
Greece
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Farnsworth, 1930.
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Pacific Fish., 1929.9.
U. S. D. C., Food 'Round World, 1925+.
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Gill, 1862.
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Authors using former name
Girard, 1854.

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Vukotinović, 1870.
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Sardina pilchardus
Albert I, 1887.
Anthony, 1909.
Baudouin, 1893.2.
Bénard, 1903.
Berthoule, 1887.1.
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Bounhiol, 1923.1.
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Ropers, 1906.
Roule, 1929.
Sauvage, 1865.
Smith, H. M., 1892.
Smitt, 1892.
Vaillant and Henneguy, 1888.

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Macleay, 1880.
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Sardinella longiceps
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Roché, 1894.1, 1894.2.
Sauvage, 1865.
Sherrin, 1886.
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Greece
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India
Scofield, N. B., 1925.

Maine
Stevenson, 1899.

New Zealand
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Buen, F., 1922.2.
Smith, W. A., 1892.

Turkey
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Belloc, 1930.
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Duhamel du Monceau, 1772.
Seilhac, 1903.
U. S. Fish. Assoc., 1927.

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Greene, 1927.
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Scofield, W. L., 1921.

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Weber, 1921.

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Pêch. Marit., 1925.

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Sardina caerulea
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Sardina neopilchardus
McCulloch, 1919.
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Sardina pilchardus
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Nomenclature
Berg, 1913.

SARDINA CAERULEA

Abundance on west coast of Mexico
Crowell, 1918.

Age
Scofield, N. B., 1923.1.
Thompson, W. F., 1926.1.

Albino
Lindner, 1929.

Behavior
Allen, W. E., 1920, 1930.

SARDINA CAERULEA—Continued.

Chemical composition
Brocklesby and Denstedt, 1930.
Dill, 1921.1, 1921.2, 1926, 1929.
Dunn, Max S., 1926.
Dunn, Max S., and Hollombe, 1927.
Finn, 1931.

Classification
Hubbs, 1929.

Compared with other sardines of world
Thompson, W. F., 1921.5.

Compared with *Sardina pilchardus*
Thompson, W. F., 1926.1.

Description
Gill, 1863.
Girard, 1854.
Jordan and Evermann, 1896.1, 1908.
Starks, 1918.
Starks and Morris, 1907.
Walford, 1931.1.

Distribution
Goode, 1903.
Jordan and Everman, 1896.1, 1896.2, 1908.
Jordan, Evermann and Clark, 1930.
Starks and Morris, 1907.
Walford, 1931.1.
West Coast Fish., 1930.5.

Eggs
Calif. Fish. Game, 1929.2.
Pacific Fish., 1929.4.
Scofield, E. C., and Lindner, 1930.
West Coast Fish., 1929.2, 1929.3.

Fat content
Dill, 1921.3.
Higgins, 1926.
West Coast Fish., 1930.5.

Fishing areas—California
Chute, 1929.2.
Clark, F. N., 1930.
Godsil, 1930.2.
Higgins, 1926.
West Coast Fish., 1927.7, 1930.5.

Fishing seasons—California
Collins, J. W., 1892.
Higgins, 1926.
Scofield, W. L., 1923, 1928.1.
Thompson, W. F., 1926.1.
Walford, 1931.1.

Food
Lewis, 1929.
Parr, 1930.
Thompson, W. F., 1926.1.

Food of dogfish
Hubbs, 1917.

Food value
Beard, 1921.
Dill, 1929.
Johnstone, 1919.
Pacific Fish., 1929.9.

Growth
Scofield, N. B., 1923.1.
Thompson, W. F., 1926.2.

Habits
Goode, 1903.
Lewis, 1929.

Larval and young stages
Breder, 1928.
Pacific Fish., 1929.4.
Scofield, E. C., and Lindner, 1930.
West Coast Fish., 1929.2.

Length studies
Andrews, 1928.
Clark, F. N., 1928, 1930.2, 1931.
Godsil, 1931.
Scofield, W. L., 1925.1, 1926.2.
Sette, 1926.1.
Thompson, W. F., 1921.3, 1926.2.

Listed
Gilbert, 1896, 1899.
Hubbs, 1930.
Jordan and Evermann, 1896.1, 1896.2.

From California
Girard, 1854.
Jordan, 1905, 1925.
Meek, 1916.
Metz, 1912.
Thompson, 1921.5.
Walford, 1931.2.

From Puget Sound
Jordan and Starks, 1895.
Starks, 1911.

Migrations
Thompson, W. F., 1921.3, 1926.1.

Nomenclature
Hubbs, 1929.

Proportional measurements
Thompson, W. F., 1926.1.

Races
Hubbs, 1925.
Thompson, W. F., 1926.1.

Reproduction
Holder, 1912.
Pacific Fish., 1929.4.
Scofield, E. C., and Lindner, 1930.
Thompson, W. F., 1919, 1926.1.

Scales
Thompson, W. F., 1926.1.

Sexual dimorphism
Scofield, W. L., 1926.2.

Sexual maturity
Higgins, 1926.

Synonomy
Jordan, 1917.
Jordan and Evermann, 1896.1.
Ulrey and Greeley, 1928.

Used as bait
Holder, 1912.
Pacific Fish., 1931.4.

Weight-length relationship
Clark, F. N., 1928.
Sette, 1926.1.
Thompson, W. F., 1926.1.

Young in Gulf of California
Breder, 1928.

SARDINA DOBROGICA

Comparison with *Sardina pilchardus*
Antipa, 1906.

Description
Antipa, 1904 1906.

SARDINA DOBROGICA—Continued.

Listed from Black Sea
Antipa, 1904, 1906.

Figured
Antipa, 1906.

Methods of fishing in Black Sea
Antipa, 1906.

SARDINA MELANOSTICTA

Chemical composition
Pentegoff and Niankovskaya, 1928.
Sekiné and Akiyama, 1926.

Classification
Cuvier and Valenciennes, 1831.

Common names
Japanese
Jordan and Hubbs, 1925.

Korean
Mori, 1928.

Cranial structure
Kishinouye, 1907.

Description
Cuvier and Valenciennes, 1831.
Günther, 1868.
Jordan and Herre, 1907.
Sol'datov and Lindberg, 1930.
Temminck and Schlegel, 1850.

Distribution
Cuvier and Valenciennes, 1831.
Kishinouye, 1907.

Eggs
Kamiya, 1925.
Kishinouye, 1907.

Enemies
Kishinouye, 1907.

Fat content
Kishinouye, 1907.

Food
Kishinouye, 1907.

Growth
Kishinouye, 1907.

Habits
Kishinouye, 1907.

Larvae
Kishinouye, 1907.

Length studies
Oku, 1904.

Listed from
Australia
M'Coy, 1867.
Japan
Jordan, 1905, 1925.
Jordan and Herre, 1907.
Jordan and Hubbs, 1925.
Jordan and Snyder, 1901.
Temminck and Schlegel, 1850.
Thompson, W. F., 1921.5.
Korea
Mori, 1928.
Philippine Islands
Seale, 1914.

Migrations
Kishinouye, 1907.

Reproduction
Japan Imp. Fish. Bur., 1904.
Kamiya, 1925.
Kishinouye, 1907.

Sexual dimorphism
Kishinouye, 1907.

Sexual maturity
Oku, 1904.
Russo, 1925.
Sauvage, 1893.

Synonomy
Günther, 1868.
M'Coy, 1867.
Soldatov and Lindberg, 1930.

SARDINA NEOPILCHARDUS

Classification
Chabanaud, 1926.

Common names, Australian
McCulloch, 1919.

Description
McCulloch, 1919.
Regan, 1916.1, 1916.2.
Roughly, 1916.
Stead, 1908.
Steindachner, 1879.
Waite, 1911, 1923.

Distribution
Buen, F., 1928.1.
McCulloch, 1911, 1919.
Ogilby, 1916.
Phillipps, 1929.
Regan, 1916.1.
Roughly, 1916.
Stead, 1906.
Young and Thomson, 1926.

Figured
Phillipps, 1924.

Food
Roughly, 1916.

Habits
McCulloch, 1922.
Roughly, 1916.

Larvae
Regan, 1916.2.

Listed from
Australia
Fowler, 1911.
Klunzinger, 1880.
McCulloch, 1911, 1922.
Meek, 1916.
Ogilby, 1916.
Roughly, 1916.
Stead, 1906, 1908.
Thompson, W. F., 1921.5.
Waite, 1899, 1904, 1905, 1916.
New Zealand
Ayson, 1924.
Meek, 1916.
Phillipps, 1921, 1924.
Phillipps and Hodgkinson, 1922.
Regan, 1916.2.
Waite, 1911.
Young and Thomson, 1926.
Tasmania
Lord, 1927.

SARDINA NEOPILCHARDUS—
Continued.

Nomenclature
Waite, 1916.

Reproduction
McCulloch, 1919.
Phillipps, 1929.

Scales
Cockerell, 1915.

Synonomy
McCulloch, 1919, 1922.
Ogilby, 1916.
Phillipps, 1927.
Regan, 1916.1.
Young and Thomson, 1926.

SARDINA OCELLATA

Description
Castlenau, 1861.

Listed from Cape of Good Hope
Bleeker, 1860.
Castlenau, 1861.
Thompson, W. F., 1921.5.

SARDINA PILCHARDUS

Abnormalities
Bateson, 1890.
Buen, F., 1926.1.
Day, 1887.
Dunn, Matthias, 1888.2.
Ford, 1930.

Age
Arné, 1928.1, 1928.2.
Bounhiol, 1912.1, 1912.2, 1916, 1919.2.
Buen, F., 1919.3, 1924, 1925.
Buen, R., 1927.
Fage, 1913.
Jenkins, 1902.
Le Gall, 1928.1, 1928.2, 1930.
Navarro, 1926.
Storrow, 1915.

Age determined by otoliths
Jenkins, 1902.

Anatomy
Chabanaud, 1926.
Cuvier and Valenciennes, 1831.
Day, 1882.
Goodrich, 1922.
Lombardo, 1884.
Matthews, 1887.
Ridewood, 1891.
Steuer, 1908.
Willughby, 1685.

Artificial fertilization
Cunningham, 1893.

Classification
Buen, F., 1927.3.
Chabanaud, 1926.
Cligny, 1913.
Cuvier and Valenciennes, 1831.
Günther, 1868.
Sedgwick, 1905.
Steuer, 1908.

Common names
Blanchère, 1868.
Buen, F., 1922.1, 1926.2.
Buen, O., 1910.
Canestrini, 1871.
Caraffa, 1929.
Carus, 1889.
Cligny, 1913.
Day, 1880.
Gibert, 1913.
Hoek, 1914.2.
Joubin and Le Danois, 1924, 1928.
Lacépède, 1829.
Le Danois, 1913, 1921.
Lowe, R. T., 1837.
McCulloch, 1919.
Moreau, E., 1881.
Pardo Garcia, 1919, 1921.

Compared with herring
Couch, 1835.
Green, 1883.
Hjort, 1913.
Shaw, 1800.

Comparison of Atlantic and Mediterranean forms
Pouchet, 1891.3.

Description
Acloque, 1900.
Aflalo, 1901.
Blanchère, 1868.
Bloch and Schneider, 1801.
Bonnaterre, 1788.
Brunchorst, 1898.
Buckland, 1881.
Buen, F., 1929.1, 1930.
Canestrini, 1871.
Caraffa, 1902, 1929.
Carus, 1889.
Chester, 1835.
Collett, 1875, 1896.
Couch, 1867.
Cunningham, 1896, 1912.
Cuvier, 1829.
Cuvier and Valenciennes, 1831.
Day, 1879, 1880, 1883.
Devedjian, 1926.
Donovan, 1804.
Duhamel du Monceau, 1772.
Ferrer y Hernández, 1903.
Fleming, 1828.
Gobin, 1891.
Guichenot, 1850.
Günther, 1868.
Hamilton, 1843.
Houghton, W., 1883.
Jordan, 1885.2, 1887.3.
Joubin and Le Danois, 1924.
Krøyer, 1838.
Kyle and Ehrenbaum, 1929.
Lacépède, 1829.
Larousse Universel, 1923.
Le Danois, 1913, 1921.
Lilljeborg, 1881.
Lowe, R. T., 1837.
Malm, 1877.
Moreau, E., 1881.
Nilsson, 1855.
Pallas, 1831.
Parnell, 1838.
Pennant, 1812.
Ravertet-Wattel, 1909.
Regan, 1916.1.
Risso, 1810, 1826.
Roule, 1914.
Sauvage, 1865.
Seilhac, 1903.
Shaw, 1800.

SARDINA PILCHARDUS—Continued.
Description—Continued.
Smith, H. M., 1905.
Smitt, 1892.
Turton, 1807.
Walbaum, 1792.
Willughby, 1685.
Winther, 1879.

Distribution
Aflalo, 1901.
Borja y Goyenche, 1920.
Buen, F., 1919.4, 1928.1, 1929.1.
Carus, 1889.
Collett, 1896.
Couch, 1867.
Cuvier and Valenciennes, 1831.
Day, 1880.
Gobin, 1891.
Gourret, 1894.7.
Günther, 1880.
Hamilton, 1843.
Hoek, 1914.2.
Krøyer, 1838.
Kyle and Ehrenbaum, 1929.
Lacépède, 1829.
Larousse Universel, 1923.
Le Danois, 1913, 1921.
Malm, 1877.
Meek, 1916.
Moreau, E., 1881.
Ramalho, 1927.
Regan, 1916.1.
Roule, 1914.
Sauvage, 1865.
Seabra, 1911.
Smith, H. M., 1905.
Smitt, 1892.
Steindachner, 1865.
Thompson, W., 1856.
Wilcocks, 1883.

Eggs
Aflalo, 1904.2.
Arné, 1927.
Barnard, 1925.
Biétrix, 1890.
Buchanan-Wollaston, 1911.
Buckland and Walpole, 1879.
Buen, F., 1927.3, 1929.1, 1930.
Cunningham, 1888, 1891, 1893, 1896, 1912.
Ehrenbaum, 1909, 1927.
Fabre-Domergue and Biétrix, 1896.1, 1896.2, 1896.3.
Hefford, 1910.
Holt, 1897, 1899.
Holt and Scott, 1897.
Joubin, 1913.
Kyle and Ehrenbaum, 1929.
Lebour, 1921.1.
Marion, 1894.1, 1894.3.
Meek, 1916.
Pouchet, 1889.1, 1889.5, 1891.1, 1891.4.
Prince, 1907.
Raffaele, 1888.
Roché, 1893.2.
Roule, 1914.
Russo, 1925.
Steuer, 1908.

Enemies
Carew, 1811.
Day, 1880, 1883.
Dunn, Matthias, 1886.
Smitt, 1892.

Fat Content
Belloc, 1930.
Fage, 1920.1.
Fage and Legendre, 1914.
Le Gall, 1930.

Figured
Acloque, 1900.
Bonnaterre, 1788.
Buen, F., 1929.1 (egg, larva, and adult).
Couch, 1867.
Cuvier and Valenciennes, 1831.
Day, 1879.
Donovan, 1804.
Kyle and Ehrenbaum, 1929.
Smitt, 1892.

Food
Albert I, 1887.
Belloc, 1930.
Bénard, 1903.
Bertram, 1869.
Blin, 1923.
Buen, F., 1919.2, 1927.3, 1927.4.
Cépède, 1907, 1908, 1910.1, 1910.2.
Chester, 1835.
Couch, 1835, 1867.
Day, 1882.
Dunn, Matthias, 1892.2.
Fabre-Domergue, 1896.
Gobin, 1891.
Guerné, 1887.
Hamilton, 1843.
Henneguy, 1891.
Houghton, W., 1883.
Jacquème, 1926.
Künstler, 1903.
Lebour, 1919, 1920, 1921.2, 1927.
Lilljeborg, 1881.
Marion, 1888, 1889.2, 1894.2.
Monticelli, 1887.
Navarro, 1926.
Pouchet and Guerné, 1887.
Ravertet-Wattel, 1909.
Richard, 1904.
Roché, 1893.1.
Rodriguez, 1908.
Ropers, 1906.
Roule, 1914.
Sauvage, 1865, 1886, 1889, 1890.
Smitt, 1892.
Steuer, 1908.
Sumner, Osburn and Cole, 1913.
Swithinbank and Bullen, 1913, 1914.
Vaillant and Henneguy, 1888.
Wilcocks, 1883.
Yarrell, 1836.

Food value
Day, 1883.
Dumont, 1919.
Johnstone, 1919.
Pérard, 1909.2.
Thomas, 1926.

Growth
Arné, 1928.1, 1928.2, 1929.
Belloc, 1930.
Belloc and Desbrosses, 1930.
Bounhiol, 1916, 1919.2.
Buen, F., 1927.3, 1929.3.
Couch, 1867.
Cunningham, 1891, 1892.1, 1892.2, 1892.3, 1892.4, 1894.5, 1896, 1912.
Dunn, Matthias, 1892.2.

SARDINA PILCHARDUS—Continued.

Growth—Continued.
Fage, 1912.2, 1913, 1920.1, 1920.2.
Gourret, 1894.2, 1894.3.
Hjort, 1913.
Jacquème, 1926.
Joubin, 1913.
Lebour, 1919.2, 1921.1.
Le Danois, 1929.
Le Gall, 1928.1, 1928.2, 1930.
McIntosh and Masterman, 1897.
Marion, 1891.2, 1894.1.
Meek, 1916.
Navarro, 1926.
Pouchet, 1889.1, 1889.6, 1890.2.
Ramalho, 1927.
Ramalho and Boto, 1930.
Regan, 1916.1.
Roché, 1894.4.
Roule, 1929.
Storrow, 1915.

Habitat
Baudouin, 1893.2.
Cunningham, 1896.
Day, 1883.
Dumont, 1919.
Moreau, E., 1881.
Ropers, 1906.
Roule, 1914.
Vaillant and Henneguy, 1888.

Habits
Aflalo, 1904.2.
Cornish, 1883.3.
Couch, 1867.
Day, 1880.
Dunn, Matthias, 1886, 1888.1, 1892.1.
McIntosh and Masterman, 1897.
Parnell, 1838.
Ravertet-Wattel, 1909.
Sauvage, 1865.
Smith, W. A., 1892.
Swithinbank and Bullen, 1913.

Heraldic emblem
Couch, 1867.
Wilcocks, 1883.

Larval and young stages
Arné, 1927.
Buen, F., 1927.3, 1929.1, 1930.
Clark, R. S., 1914, 1920.
Cunningham, 1889, 1891, 1893, 1896.
Ehrenbaum, 1909, 1927.
Fabre-Domergue and Biétrix, 1896.1, 1896.3, 1897.
Fage, 1920.2.
Holt, 1899.
Joubin, 1913.
Lebour, 1921.1.
Le Gall, 1928.2.
McIntosh and Masterman, 1897.
Marion, 1889.2, 1894.1, 1894.3.
Mazarelli, 1910.
Prince, 1907.
Raffaele, 1888.
Ravertet-Wattel, 1909.
Roché, 1893.2.
Roule, 1914.
Roule and Angel, 1924.
Steuer, 1908.

Length studies
Arné, 1927, 1928.1, 1928.2, 1929.
Belloc, 1930.
Bouvier-Lapierre, 1887.
Buen, F., 1919.2, 1929.2.
Buen, O., 1910.
Buen, R., 1927.
Cligny, 1919.
Cornish, 1879.
Cunningham, 1892.3, 1892.4.
Fage, 1913.
Gourret, 1894.2, 1894.3, 1894.5.
Le Gall, 1928.2, 1930.1, 1930.2.
Lozano y Rey, 1921.
Marion, 1894.1.
Pouchet, 1889.1, 1889.2, 1889.3, 1889.4, 1890.1, 1891.1, 1891.2, 1891.4.
Pouchet and Biétrix, 1892.
Sauvage, 1890.
Smith, H. M., 1905.

Life history
Bénard, 1903.
Buen, F., 1927.1, 1929.3.
Buen, R., 1927.
Caillo, 1855.
Cunningham, 1893.
Fabre-Domergue, 1896.
Hjort, 1913.
Marion, 1889.1.

Listed from
Adriatic
Perugia, 1866.
Balearic Islands
Fage, 1907.1.
Ferrer y Hernández, 1903.
Canary Islands
Vinciguerra, 1893.
England
Patterson, 1897.
Europe
Bean, 1880.
Guérin-Ganivet, 1912.
Jordan, 1905, 1925.
Roule, 1919.
Schonevelde, 1624.
Sedgwick, 1905.
Thompson, W. F., 1921.5.
Gulf of Trieste
Graeffe, 1886.
Ireland
Thompson, W., 1856.
Morocco
Buen, O., 1912.2.
Fage, 1911, 1912.1.
North America, east coast
Jordan, 1887.3.
Portugal
Osorio, 1895.
Seabra, 1911.
Scotland
Fulton, 1904.
Johnston, G., 1838.
Spain
Buen, F., 1916.
Buen, O., 1910, 1912.1.
Calderon, 1889.
Lozano y Rey, 1919, 1921.
Machado, 1857.
Sweden
Cederström, 1876.
Lilljeborg, 1881.
Malm, 1877.
Tunis
Le Danois and Belloc (no date).
West Indies
Jordan, 1887.1, 1887.2.

SARDINA PILCHARDUS—Continued.

Measurements, proportional
Belloc, 1930.
Buen, F., 1919.1.
Le Gall, 1928.1, 1928.2, 1930.

Metamorphosis
Buen, F., 1927.3.

Migrations
Albert I, 1887.
Anthony, 1909.
Baudouin, 1893.2.
Bénard, 1903.
Berthoule, 1887.1.
Blavier, 1882.
Bounhiol, 1923.1.
Buen, F., 1922.2, 1924, 1927.4, 1929.3.
Buen, R., 1927.
Caillo, 1855.
Chester 1835.
Cornish, 1883.2.
Day, 1880, 1883.
Deslandes, 1727.
Duhamel du Monceau, 1772.
Dumont, 1919, 1929.
Dunn, Matthias, 1892.1.
Fabre-Domergue, 1896.
Gifford, 1883.
Gobin, 1891.
Guéry, 1893.
Hérubel, 1912.
Hjort, 1913.
Hoek, 1914.1.
Holdsworth, 1874.
Houghton, W., 1883.
Joubin, 1913.
Künstler, 1903.
Le Gall, 1928.1, 1930.1, 1930.2.
M., 1903.
Mader, 1909.
Marchand, 1926.
Marion, 1889.2, 1894.1.
Meek, 1916.
Parnell, 1838.
Pouchet, 1890.2, 1891.2.
Rodriguez, 1908.
Ropers, 1906.
Roule, 1929.
Sauvage, 1865.
Smith, H. M., 1892.
Smitt, 1892.
Vaillant and Henneguy, 1888.

Morphology
Arné, 1929.
Belloc, 1930.
Lombardo, 1884.
Steuer, 1908.

Otoliths
Jenkins, 1902.
Scott, 1906.
Steuer, 1908.

Parasites

Copepods
Baudouin, 1904, 1905.1, 1905.2, 1905.3, 1907, 1908, 1909, 1910, 1911.1, 1911.2, 1914, 1918.
Cépède, 1908, 1910.1.
Cornalia, 1875.
Day, 1880, 1883.
Giard, 1888.
Joubin, 1888.1, 1888.2.
Moreau, E., 1881.
Richiardi, 1875.

Internal
Georgévitch, 1926
Thélohan, 1890.1, 1890.2.

More than one kind
Baudouin, 1905.3.
Day, 1880, 1883.
Gibert, 1913.
Monticelli, 1887.
Sauvage, 1890.
Steuer, 1908.
Sumner, Osburn and Cole, 1913.

Nematodes
Cépède, 1908.

Races
Arné, 1929.
Belloc, 1930.
Bertin, 1925.
Buen, F., 1927.1, 1927.3, 1927.4.
Fage, 1920.1, 1920.2.
Hoek, 1914.1.
Le Danois, 1929, 1930.
Le Gall, 1928.2, 1930.
Mader, 1909.
Navarro, 1926.
Pouchet, 1891.3.
Ramalho, 1929.

Reproduction
Aflalo, 1904.2.
Arné, 1927, 1928.1, 1928.2, 1929.
Bounhiol, 1913.1, 1913.2, 1923.1.
Brook, 1885.
Buckland and Walpole, 1879.
Buen, F., 1924, 1927.3, 1927.4, 1929.3.
Buen, R., 1927.
Cligny, 1919.
Couch, 1835, 1867.
Cunningham, 1888, 1889, 1891, 1892.5, 1893, 1896, 1912.
Dantan, 1905.
Day, 1879, 1880, 1883.
Devedjian, 1926.
Fabre-Domergue, 1896.
Fabre-Domergue and Biétrix, 1896.3.
Fage, 1920.2.
Graeffe, 1886.
Guéry, 1893.
Hamilton, 1843.
Henneguy, 1891.
Hérubel, 1912.
Holdsworth, 1874.
Holt, 1899.
Houghton, W., 1883.
Jacquème, 1926.
Joubin, 1913.
Launette, 1888.
Le Gall, 1928.1, 1928.2, 1930.
McIntosh and Masterman, 1897.
Mader, 1909.
Marion, 1888, 1889.1, 1889.2, 1891.1, 1891.2, 1894.1, 1894.3.
Meek, 1916.
Navarro, 1926.
Pouchet, 1889.5, 1891.1.
Ramalho, 1927, 1929.
Regan, 1916.1.
Roché, 1893.3.
Rodriguez, 1908.
Ropers, 1906.

SARDINA PILCHARDUS—Continued.

Reproduction—Continued.
Roule, 1914.
Smith, H. M., 1902.1.
Smith, W. A., 1892.
Smitt, 1892.
Steuer, 1908.
Vaillant and Henneguy, 1888.
Wilcocks, 1883.

Scale study
Arné, 1928.1, 1928.2.
Bounhiol, 1912.1, 1912.2, 1916.
Buen, F., 1919.3, 1924, 1925.
Buen, R., 1927.
Cockerell, 1914, 1915.
Hjort, 1913.
Le Gall, 1930.
Meek, 1916.
Navarro, 1926.
Ramalho, 1927.
Ramalho and Boto, 1930.
Steuer, 1908.
Storrow, 1915.

Scales, number of
Bateson, 1890, 1894.

Sexual dimorphism
Belloc, 1930.
Bounhiol, 1917.1.
Buen, F., 1927.3.
Belloc and Desbrosses, 1930.
Le Danois, 1930.

Sexual maturity
Arné, 1927, 1928.2.
Belloc, 1930.
Belloc and Desbrosses, 1930.
Bounhiol, 1913.2, 1919.2.
Buen, F., 1927.1, 1927.3, 1927.4.
Buen, O., 1916.
Buen, R., 1927.
Cornish, 1881.
Cunningham, 1892.3, 1896, 1912.
Le Gall, 1928.1, 1928.2, 1930.
Lo Bianco, 1888.
Logan, 1863.
Marion, 1888.
Miranda y Rivera, 1930.
Pouchet, 1889.1, 1889.5, 1890.1, 1891.2.
Pouchet and Biétrix, 1892.
Ramalho, 1927.
Russo, 1925.
Sauvage, 1893.

Synonomy
Buen, F., 1919.4, 1926.2, 1927.3, 1930.
Carus, 1889.
Cligny, 1913.
Couch, 1867.
Day, 1880.
Gilbert, 1913.
Guichenot, 1850.
Günther, 1868.
Jordan, 1887.3, 1917.
Krøyer, 1838.
Le Danois, 1913.
Lilljeborg, 1881.
Metzelaar, 1919.
Moreau, E., 1881.
Pardo Garcia, 1921.
Regan, 1916.1.
Seabra, 1911.
Shaw, 1800.
Smitt, 1892.
Steuer, 1908.
Walbaum, 1792.
White, 1851.
Winther, 1879.
Yarrell, 1836.

Unusual occurrence
Cornish, 1870, 1872, 1879, 1880.
Fulton, 1904.

Weight-length relationship
Buen, F., 1919.2, 1929.2.
Buen, R., 1927.
Le Gall, 1930.2.

SARDINA PSEUDOHISPANICA

Description
Evermann and Marsh, 1902.
Goode and Bean, 1880.
Günther, 1868.
Jordan and Evermann, 1896.1, 1908.
Jordan and Gilbert, 1883.1.
Kendall and Smith, 1895.
Poey y Aloy, 1851, 1856.

Distribution
Evermann and Marsh, 1902.
Jordan and Evermann, 1896.1, 1896.2, 1908.
Kendall, 1908.
Kendall and Smith, 1895.

Food
Sumner, Osburn and Cole, 1913.

Food of snappers
Jordan, 1885.1.

Listed from
Brazil
Fowler, 1911.
Florida
Evermann and Kendall, 1900.
Goode and Bean, 1880.
Gulf of Mexico
Goode and Bean, 1883.
Meek, 1916.
Louisiana
Weymouth, 1910.
North America
Jordan, 1887.3.
Smith, H. M., 1898, 1902.2.
West Indies
Bean and Dresel, 1885.
Evermann and Marsh, 1902.
Jordan, 1887.1, 1887.2, 1905, 1925.
Poey y Aloy, 1851, 1856, 1865, 1881.

Parasites
Linton, 1901.
Sumner, Osburn and Cole, 1913.

Scale structure
Cockerell, 1914.

Synonomy
Günther, 1868.
Jordan and Evermann, 1896.1.
Kendall, 1908.

SARDINA SAJAX

Classification
Chabanaud, 1926.

ARDINA SAJAX—Continued.
Compared with herring
Lockington, 1881.
Description
Arthur, 1883.
Barnard, 1925.
Bleeker, 1853.
Castlenau, 1872.
Evermann and Radcliffe, 1917.
Gilchrist, 1909, 1913.
Goode, 1884.
Günther, 1868.
Hutton and Hector, 1872.
Jenyns, 1842.
Johnston, R. M., 1883.
Jordan and Gilbert, 1881.1, 1882.1.
Lockington, 1880.
Macleay, 1880.
Ogilby, 1893.
Regan, 1916.1.
Sherrin, 1886.
Distribution
Arthur, 1883.
Barnard, 1925.
Buen, F., 1928.1.
Evermann and Radcliffe, 1917.
Goode, 1884, 1903.
Günther, 1880.
Hutton and Hector, 1872.
Jordan and Gilbert, 1882.1, 1882.2.
Lockington, 1881.
Regan, 1916.1.
Sherrin, 1886.
Zietz, 1908.
Eggs
Barnard, 1925.
Food
Arthur, 1883.
Growth
Regan, 1916.1.
Habits
Goode, 1903.
Murphy, 1923.
Larvae
Barnard, 1925.
Listed from
Australia
Castlenau, 1872, 1878.
Lucas, 1890.
Macleay, 1880, 1882.
Ogilby, 1893.
Ramsay, 1883.
Tenison-Woods, 1882.
Zietz, 1908.
California
Goode, 1903.
Jordan and Gilbert, 1881.1, 1881.2.
Jordan and Jouy, 1882.
Lockington, 1881.
Chile
Castillo, 1912.
Delfin, 1901.
Fowler, 1916.
Jordan, 1905, 1925.
Steindachner, 1898.
Japan
Bleeker, 1853.
New Zealand
Hutton, 1890, 1904.
Hutton and Hector, 1872.
Thomson, G. M., 1892.
Thomson, J. A., 1918.
Waite, 1907.
North America
Jordan, 1887.3.
Pacific and Indian Oceans
Meek, 1916.
Peru
Abbott, 1900.
Evermann and Radcliffe, 1917.
Jenyns, 1842.
Murphy, 1923.
Thompson, W. F., 1921.5.
South Africa
Barnard, 1925.
Biden, 1930.
Bonde, 1929.
Gilchrist, 1909, 1913.
Tasmania
Johnston, R. M., 1883, 1890.
Migrations
Eigenmann, 1893.
Macleay, 1880.
Ramsay, 1883.
Nomenclature
Bleeker, 1853.
Reproduction
Arthur, 1883.
Regan, 1916.1.
Synonomy
Abbott, 1900.
Castlenau, 1872.
Delfin, 1901.
Evermann and Radcliffe, 1917.
Gilchrist, 1913.
Günther, 1868.
Jordan and Gilbert, 1882.1.
Ogilby, 1893.
Regan, 1916.1.

SARDINA SARDINA. See *Sardina pilchardus.*
Authors using former name
Chabanaud, 1926.

SARDINE FAILURE OR "CRISIS"
In France
Causes
Amieux, 1912.
Baudouin, 1888.
Bellet, 1913.
Chauvin, 1909.
Fabre-Domergue and Biétrix, 1896.3.
France Chamb. Dép., 1913.
France Comm. Études, 1908.
France Min. Mar., 1908.
Gerville-Réache, 1908.
Gouault, 1919.
Groupement Fabricants Français, 1905.
Künstler, 1903.
Launette, 1876.
Le Goffic, 1912.
M., 1903.
Odin, 1894.
Oeuvre, 1913.

SARDINE FAILURE OR "CRISIS"—Continued.

In France—Continued.

Causes—Continued.

Ouizille, G., 1912.1, 1912.2.
Roché, 1893.3, 1894.1, 1894.2.
Pérard, 1913.1, 1913.3.
Ropers, 1906.
Saint-Léon and Seilhac, 1913.
Seilhac, 1903, 1905.
Thoulet, 1913.
Vachez, 1913.1.
Vaillant and Henneguy, 1888.

Recommendations

Bénard, 1903.
Bénard and Künstler, 1903.
Canu, 1908, 1912.
Chauvin, 1909.
Fabre-Domergue and Biétrix, 1896.3.
Gerville-Réache, 1908.
Gouault, 1919.
Groupement Fabricants Français, 1905.
Gruvel, 1913.
Künstler, 1903.
Launette, 1876.
Le Bail, 1908.
Le Goffic, 1912.
Odin, 1894.
Pérard, 1909.1.
Potigny, 1908.
Rodel, 1912.
Ropers, 1906.
Saint-Léon and Seilhac, 1913.
Seilhac, 1903, 1905.

In Spain

Causes

Rodriguez, 1908.
Vachez, 1913.1.

Recommendations

Rodriguez, 1908.

"SARDINE" (SMALL HERRING) OF EAST COAST OF NORTH AMERICA

By-products

Weber, 1921.

Canning methods

Avard, 1918.
Weber, 1921.

Industry

Weber, 1921.

Methods of fishing

Avard, 1918.

SARDINELLA

Description

Berg, 1913.

Distribution

Berg, 1913.

Listed from New York

Bean, 1903.

Nomenclature

Berg, 1913.

SARDINELLA CAERULEUS. See *Sardina caerulea.*

Authors using former name

Allen, W. E., 1920.
Hubbs, 1917.
Metz, 1912.
Starks and Morris, 1907.

SARDINELLA IMMACULATA

Common names, Korean

Mori, 1928.

Listed from Korea

Mori, 1928.

SARDINELLA JUSSIEU

Description

Fowler, 1928.

Synonomy

Fowler, 1928.

SARDINELLA LONGICEPS

Description

Hornell and Nayudu, 1924.

Fat content

Hornell and Nayudu, 1924.

Fishery, Philippine Islands

Montalban, 1930.

Food

Hornell, 1910.
Hornell and Nayudu, 1910.

Growth

Hornell and Nayudu, 1924.

Migrations

Hornell, 1910.

Parasites

Hornell and Nayudu, 1924.

Preservation methods

Montalban, 1930.

Races

Hornell and Nayudu, 1924.

Reproduction

Hornell, 1910.
Hornell and Nayudu, 1924.

Scales

Hornell and Nayudu, 1924.

Sexual maturity

Hornell and Nayudu, 1924.

SARDINELLA MACROPHTHALMUS

Description

Breder, 1929.

Distribution

Breder, 1929.

Figured

Breder, 1929.

Key

Breder, 1929.

SARDINELLA MELANOSTICTA. *Sardina melanosticta.*

Authors using former name

Jordan, 1905.
Jordan and Herre, 1907.
Kamiya, 1925.
Mori, 1928.
Seale, 1914.
Soldatov and Lindberg, 1930.

SARDINELLA MELANURA

Description

Fowler, 1928.

Synonomy

Fowler, 1928.

ARDINELLA PERFORATA

Description
Fowler, 1928.

Synonomy
Fowler, 1928.

ARDINELLA PILCHARDUS. See *Sardina pilchardus.*

Authors using former name
Jordan, 1905.

ARDINELLA PSEUDOHISPANICA. See *Sardina pseudohispanica.*

Authors using former name
Jordan, 1905.

ARDINELLA SAJAX. See *Sardina sajax.*

Authors using former name
Evermann and Radcliffe, 1917.
Jordan, 1905.
Murphy, 1923.

ARDINELLA SARDINA

Color
Meek and Hildebrand, 1923.

Description
Breder, 1929.
Meek and Hildebrand, 1923.
Starks, 1913.

Distribution
Breder, 1929.
Meek and Hildebrand, 1923.

Figured
Breder, 1929.

Key
Breder, 1929.

Listed from Brazil
Starks, 1913.

Synonomy
Meek and Hildebrand, 1923.

ARDINELLA SIRM

Coloration
Jordan and Seale, 1906.

Description
Fowler, 1928.

Listed from Samoa
Jordan and Seale, 1906.

Synonomy
Fowler, 1928.

ARDINELLA STOLIFERA

Abundant off Mexico
Jordan, Starks, Culver and Williams, 1895.

ARDINELLA TOLI

Listed from Formosa
Jordan and Richardson, 1909.

ARDINELLA ZUNASHI

Common names, Korean
Mori, 1928.

Listed from Korea
Mori, 1928.

ARDINIA. See *Sardina.*

ARDINOPS

Proposed as generic name of California sardine
Hubbs, 1929.

CALES

Number of, in *Sardina pilchardus*
Bateson, 1890, 1894.

Study of
Arné, 1928.1, 1928.2.
Bounhiol, 1912.1, 1912.2, 1916.
Buen, F., 1919.3, 1924, 1925.
Buen, R., 1927.
Cockerell, 1914, 1915.
Hjort, 1913.
Hornell and Nayudu, 1924.
Le Gall, 1930.
Meek, 1916.
Navarro, 1926.
Ramalho, 1927.
Ramalho and Boto, 1930.
Steuer, 1908.
Storrow, 1915.
Thompson, W. F., 1926.1.

CIENTIFIC INVESTIGATIONS

British Columbia
British Columbia Comm. Fish., 1930, 1931.
Canadian Fish., 1929.2, 1929.3.

California
Andrews, 1928.
Bryant, 1924.
Calif. Fish Game, 1922.1.
Chute, 1930.
Clark, F. N., 1928, 1930.2.
Higgins, 1920, 1923, 1926.
Pacific Fish., 1918.5, 1927.2.
Scofield, E. C., and Lindner, 1930.
Scofield, N. B., 1921.1, 1923.1.
Scofield, W. L., 1927.
Sette, 1920, 1926.1.
Thompson, R. M., 1927.
Thompson, W. F., 1919, 1920.1, 1920.2, 1921.1, 1921.2, 1924, 1926.1.
Thompson, W. F., and Edser, 1929.
Thompson, W. F., and Higgins, 1920.
West Coast Fish., 1929.3, 1930.4.

England
England Bd. Ag. Fish., 1913.

Europe
Allen, E. J., 1922.
Thoulet, 1913.

France
Anthony, 1909.
Bénard, 1903.
Pouchet, 1887.2, 1887.3, 1889.2.
Roché, 1893.3, 1894.1.
Scotland Fish. Bd., 1892.
Smith, W. A., 1892.

Spain
Instructions for
Buen, F., 1919.1.

SEXUAL DIMORPHISM

Sardina caerulea
Scofield, W. L., 1926.2.

Sardina melanosticta
Kishinouye, 1907.

SEXUAL DIMORPHISM—Continued.

Sardina pilchardus

Belloc, 1930.
Belloc and Desbrosses, 1930.
Bounhiol, 1917.1.
Buen, F., 1927.3.
Le Danois, 1930.

SEXUAL MATURITY

Sardina caerulea

Higgins, 1926.
Thompson, W. F., 1926.1.

Sardina melanosticta

Oku, 1904.

Sardina pilchardus

Arné, 1927, 1928.2.
Belloc, 1930.
Belloc and Desbrosses, 1930.
Bounhiol, 1913.2, 1919.2.
Buen, F., 1927.1, 1927.3, 1927.4.
Buen, O., 1916.
Buen, R., 1927.
Cornish, 1881.
Cunningham, 1892.3, 1896, 1912.
Le Gall, 1928.1, 1928.2, 1930.1, 1930.2.
Lo Bianco, 1888.
Logan, 1863.
Marion, 1888.
Miranda y Rivera, 1930.
Pouchet, 1889.1, 1889.5, 1890.1, 1891.2.
Pouchet and Biétrix, 1892.
Ramalho, 1927.
Russo, 1925.
Sauvage, 1893.

Sardinella longiceps

Hornell and Nayudu, 1924.

SIZE AT DIFFERENT SEASONS. See Length studies.

STATISTICS

Africa

Pêch. Marit., 1924.2.

Algeria

Auffret, 1930.
Darboux *et al*, 1906.
Garau, 1909.
Pêch. Marit., 1929.3.

Austro-Hungary

Weaver, 1885.

California

Calif. Bur. Comm. Fish., 1929.1, 1929.2, 1930.1, 1930.2.
Calif. Dept. Comm. Fish., 1916, 1917, 1919.1, 1919.2, 1920.1, 1920.2, 1921, 1921+, 1922, 1923.1, 1923.2, 1924, 1925, 1926, 1927, 1928.1, 1928.2.
Calif. Fish., 1929.4.
Calif. Fish Game, 1916.2, 1924.1.
Christo, 1931.
Cobb, 1918.
Collins, J. W., 1892.
Dado, 1931.
Fiedler, 1930.1, 1930.2, 1931.
Fisk. Gang, 1930.2.
Jordan, 1887.4.
Lindner, 1930.2.
Pacific Fish., 1920.2, 1926.4, 1927.3, 1928.3, 1928.4, 1928.5, 1929.9, 1930.4, 1930.6, 1931.2.
Radcliffe, 1921, 1923.1, 1923.2.
Scofield, N. B., 1921.1, 1927.
Scofield, W. L., 1925.2, 1928.1, 1928.2, 1929.3, 1929.4, 1930.2, 1930.3.
Sette, 1925, 1927, 1928, 1929.
Smith, H. M., 1896.
Taylor, 1924.
Terry, 1929.
Thompson, W. F., 1922, 1926.1.
Tressler, 1923.
U. S. Tariff Comm., 1925, 1931.
West Coast Fish., 1929.1, 1929.4, 1929.9.
Whitehead, 1929.
Wilcox, 1898, 1902, 1907.

Canada

Canada Dom. Bur. Stat.
Canada Fish. Branch.
Pacific Fish., 1928.5, 1931.2.

Chile

Houghton, M. T., 1930.

Ceylon

Ceylon Mar. Biol., 1930.

Egypt

Egypt Min. Fin., 1921+.

England

Aflalo, 1904.1.
Bloch, 1797.
Borlase, 1758.
Buckland and Walpole, 1879.
Cons. Explor. Mer, 1906+.
Couch, 1835.
Courtenay, 1837, 1840.
England Bd. Ag. Fish., 1906.
England Insp. Fish., 1887.
England Min. Ag. Fish. (Monthly and annual reports.)
Fox, 1885.
Hoek, 1914.1.
Holdsworth, 1874.
Houghton, W., 1883.
Kyle, 1928.
Lemon, 1785.
Pennant, 1812.
Roach, 1890, 1891.
Roberts, 1871.
Russell, E. S., 1915.
Saint-Léon and Seilhac, 1913.
Wilcocks, 1883.

Esthonia

Vienkoff, 1893.

Europe

Buen, F., 1928.1, 1929.2.
Quibbon, 1925.

France

Arné, 1927, 1929.
Baudouin, 1893.2.
Berthoule, 1887.2.
Bouvier-Lapierre, 1887.
Cong. Nat. Pêch. Marit., 1908.
Cons. Explor. Mer, 1906+.
Fage, 1907.2.
Ferrari, 1887.
France Min. Trav. Pub.
France Off. Sci. Pêch. Marit., 1924+.
Gerville-Réache, 1888.
Gourret, 1889.1, 1889.2, 1894.1, 1894.2, 1894.4, 1894.5, 1894.6, 1894.7, 1897.
Guyader, 1926.
Hérubel, 1912, 1919.

STATISTICS—Continued.

France—Continued.
Hoek, 1914.1.
Kerzoncuf, 1916, 1917.
Kyle, 1928.
Lemy, 1901.
Marion, 1888, 1894.1.
Odin, 1894.
Ouizille, G., 1912.2.
Ouizille, H., 1926.2, 1926.3, 1926.4.
Pêch. Marit., 1928.1.
Pouchet, 1890.1, 1891.1.
Revue Marit., 1893.
Saint-Léon and Seilhac, 1913.
Sée, 1929.2.
Simmonds, 1879.
Smith, H. M., 1902.1.
Walker, 1885.

Hawaiian Islands
Cobb, 1902.

India
Hornell, 1910.

Ireland
Ireland Insp. Fish., 1872.

Japan
Japan Dept. Fin., 1915.
Japan Imp. Fish. Bur., 1904.
Japan Sec. Stat., 1922+.

Maine
Earll, 1887.1, 1887.2.
Earll and Smith, 1889.
Fiedler, 1930.1.
Hall, 1898.
Radcliffe, 1921, 1923.2.
Sette, 1927, 1928, 1929.
Taylor, 1924.
Tressler, 1923.

Morocco
Pêch. Marit., 1928.1, 1929.2.

Norway
U. S. D. C., Fish. Sci. Trade, 1930.

Portugal
Guyader, 1926.
Hoek, 1914.1.
Huhlein, 1931.
Lowrie, 1920.
Nobre, 1895.1.
Portugal Min. Mar.

Sicily
Russo, 1925.

Spain
Alaejos Sanz, 1923.
Bol. Pescas, 1916.
Bolin y de la Cámara, 1922.
Buen, F., 1922, 1929.2.
Buen, O., 1923.
Buen, R., 1927.
Delgado, 1921.
Dominguez, 1922.
Franco y Salinas, 1923.
Guyader, 1926.
Lleó, 1923.
Miranda y Rivera, 1921, 1923.
Pontes y Avila, 1923.
Roldán, 1921.
Spain Mar. Merc. Pesc., 1915.
Spain. Min. Fom., 1929.
Vachez, 1913.2, 1913.3.

Tunis
Bourge, 1919.
Fages and Ponzevera, 1908.
Monconduit, 1927.

Turkey
Devedjian, 1926.
Ninni, 1923.
Bauer, 1921.

United States
Radcliffe, 1920, 1921, 1923.2, 1923.3.

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TARIFF

Belgium
West Coast Fish., 1930.7.

Chile
Scofield, N. B., 1922.

Cuba
West Coast Fish., 1930.7.

France
Berthoule, 1887.2.

United States
Kemp *et al*, 1885.
U. S. Tariff Comm., 1925.

"TERRE ROUGE" USED IN SALTING SARDINES
Athanassopoulos, 1925.

U

UNLOADING OF FISH
Scofield, N. B., 1929.3.

USES, UNUSUAL

In general
Mitchell, 1883.

In heraldry
Couch, 1867.
Wilcocks, 1883.

In witchcraft
Tsuda, 1917.

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VERTICAL DISTRIBUTION
Bounhiol, 1917.2, 1919.1, 1924.
Buen, F., 1927.4.
Russell, F. S., 1926.

VITAMINS IN SARDINE OIL
Nelson and Manning, 1930.

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WEATHER—EFFECT ON FISHERY
Bounhiol, 1917.2, 1924.

WEIGHT-LENGTH RELATIONSHIP

Sardina caerulea
Clark, F. N., 1928.
Sette, 1926.1.
Thompson, W. F., 1926.1.

Sardina melanosticta
Oku, 1904.

Sardina pilchardus
Buen, F., 1919.2, 1929.2.
Buen, R., 1927.
Le Gall, 1930.2.

DIVISION OF FISH AND GAME OF CALIFORNIA

BUREAU OF COMMERCIAL FISHERIES

FISH BULLETINS

* No. 1. Report on Fish Conditions. 1913; 48 pp., 3 figs. Contains:
The Abalone Industry in California. By Charles Lincoln Edwards.
The Towing of Salmon and Steelhead Fry from Sacramento to the Sea in a "Live Car." By N. B. Scofield.
The Problem of the Spiny Lobster. By Bennet M. Allen.
Investigation of the Clams of California. By Harold Heath.
Investigation of the Life History of the Edible Crab (*Cancer magister*). By F. W. Weymouth.
A General Report on a Quinnat Salmon Investigation Carried on During the Spring and Summer of 1911. By N. B. Scofield.
Trout and Black Bass Planting and Transplanting in the San Joaquin and Southern Sierra Districts. By A. D. Ferguson.

* No. 2. The Scientific Investigation of Marine Fisheries as Related to the Work of the Fish and Game Commission in Southern California. By Will F. Thompson. 1919; 27 pp., 4 figs.

* No. 3. The Spawning of the Grunion (*Leuresthes tenuis*). By Will F. Thompson, assisted by Julia Bell Thompson. July 15, 1919; 29 pp., 9 figs.

* No. 4. The Edible Clams, Mussels and Scallops of California. By Frank W. Weymouth. Jan. 10, 1921; 74 pp., 19 pls., 26 figs.

* No. 5. A Key to the Families of Marine Fishes of the West Coast. By Edwin C. Starks. March 3, 1921; 16 pp., 4 figs.

* No. 6. A History of California Shore Whaling. By Edwin C. Starks. October, 1922; 38 pp., 22 figs.

* No. 7. The Life History and Growth of the Pismo Clam. By Frank W. Weymouth. 1923; 120 pp., 15 figs., 18 graphs.

* No. 8. Racial and Seasonal Variation in the Pacific Herring, California Sardine and California Anchovy. By Carl L. Hubbs. February, 1925; 23 pp., 4 pls.

* No. 9. Preliminary Investigation of the Purse Seine Industry of Southern California. By Tage Skogsberg. 1925; 95 pp., 23 figs.

* No. 10. The Life History of *Leuresthes tenuis*, an Atherine Fish with Tide-controlled Spawning Habits. By Frances N. Clark. October, 1925; 51 pp., 6 graphs, 7 pls.

No. 11. The California Sardine. By the Staff of the California State Fisheries Laboratory. 1926; 221 pp., 74 figs.
I. Thompson, Will F. The California Sardine and the Study of the Available Supply.
II. Sette, Oscar Elton. Sampling the California Sardine: A Study of the Adequacy of Various Systems at Monterey.
III. Higgins, Elmer H. A Study of Fluctuations in the Sardine Fishery at San Pedro.
IV. Thompson, Will F. Errors in the Method of Sampling Used in the Study of the California Sardine.
V. Scofield, W. L. The Sardine at Monterey: Dominant Size Classes and their Progression, 1919-1923.

No. 12. The Weight-Length Relationship of the California Sardine (*Sardina caerulea*) at San Pedro. By Frances N. Clark. 1928; 58 pp., 11 figs.

No. 13. The Seasonal Average Length Trends at Monterey of the California Sardine (*Sardina caerulea*). By Carroll B. Andrews. 1928; 13 pp., 6 figs.

* No. 14. Report on the Seals and Sea Lions of California. By Paul Bonnot. 1928; 61 pp., 38 figs.

* No. 15. The Commercial Fish Catch of California for the years 1926 and 1927. By the Bureau of Commercial Fisheries. 1929; 94 pp., 52 figs.

No. 16. The Life-History of the California Jack Smelt, *Atherinopsis californiensis*. By Frances N. Clark. 1929; 22 pp., 12 figs.

No. 17. Sacramento-San Joaquin Salmon (*Oncorhynchus tschawytscha*) Fishery of California. By G. H. Clark. 1929; 73 pp., 32 figs.

No. 18. The Pismo Clam: Further Studies of its Life-history and Depletion. By William C. Herrington. 1930; 67 pp., 16 figs.

No. 19. Sardine Fishing Methods at Monterey, California. By W. L. Scofield. 1929; 61 pp., 27 figs.

* Out of print.

No. 20. The Commercial Fish Catch of California for the Year 1928. By the Staff of the Bureau of Commercial Fisheries. 1930; 109 pp., 62 figs.
No. 21. Analysis of Boat Catches of White Sea Bass (*Cynoscion nobilis*) at San Pedro, California. By S. S. Whitehead. 1930; 26 pp., 20 figs.
No. 22. A Bibliography of the Tunas. By Genevieve Corwin. 1930; 103 pp.
No. 23. Success of the Purse Seine Boat in the Sardine Fishery at Monterey, California (1929–1930 Fishing Season). By J. B. Phillips. 1930; 28 pp., 19 figs.
No. 24. An Analysis of the Catch Statistics of the Striped Bass (*Roccus lineatus*) Fishery of California. By J. A. Craig. 1930; 41 pp., 22 figs.
No. 25. Fishing Areas Along the California Coast for the Sardine (*Sardina caerulea*). By the California State Fisheries Laboratory. 1930; 44 pp., 25 figs.
No. 26. Seasonal Changes in the Daily Average Length of the California Sardine (*Sardina caerulea*). By Frances N. Clark. 1930; 20 pp., 11 figs.
No. 27. The Ring Net, Half Ring Net, or Purse Lampara in the Fisheries of California. By Donald H. Fry, Jr., 1930; 65 pp., 28 figs.
No. 28. Handbook of Common Commercial and Game Fishes of California. By Lionel A. Walford. 1931; 183 pp., 137 figs.
No. 29. The Striped Bass of California. By Eugene C. Scofield. 1931; 82 pp., 46 figs.
No. 30. The Commercial Fish Catch of California for the Year 1929. By the staff of the Bureau of Commercial Fisheries. 1931; 133 pp., 75 figs.
No. 31. Studies of the Length Frequencies of the California Sardine (*Sardina caerulea*). By the California State Fisheries Laboratory. 1931; 53 pp., 24 figs.
No. 32. The California Halibut (*Paralichthys californicus*) and an Analysis of the Boat Catches. By G. H. Clark. 1931; 52 pp., 25 figs.
No. 33. Fishing Methods for the Bluefin Tuna (*Thunnus thynnus*) and an Analysis of the Catches. By S. S. Whitehead. 1931.
No. 34. Salmon in the Klamath River, California. By J. O. Snyder. 1931.
No. 35. A Distributional List of the Species of Freshwater Fishes Known to Occur in California. By Barton W. Evermann and Howard W. Clark. 1931; 67 pp.
No. 36. A Bibliography of the Sardines. By Genevieve Corwin Wheeler. 1931; 133 pp.

These bulletins are offered free of charge to interested persons and in exchange for the publications of other bodies engaged in marine research. Address: California State Fisheries Laboratory, Terminal Island, California.

* Out of print.

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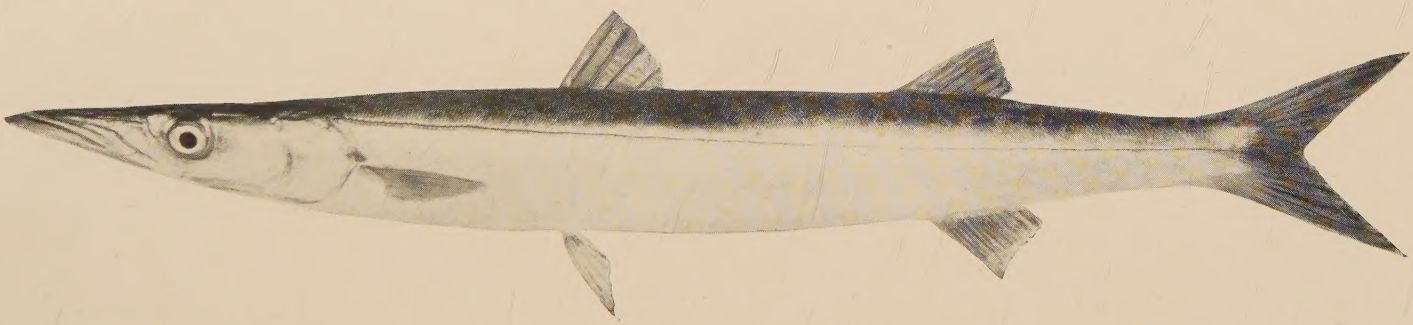

The California barracuda (*Sphyraena argentea*).

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